

United States - Housing Corp. - Reports

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION

WAR EMERGENCY CONSTRUCTION
(HOUSING WAR WORKERS)

REPORT

OF THE

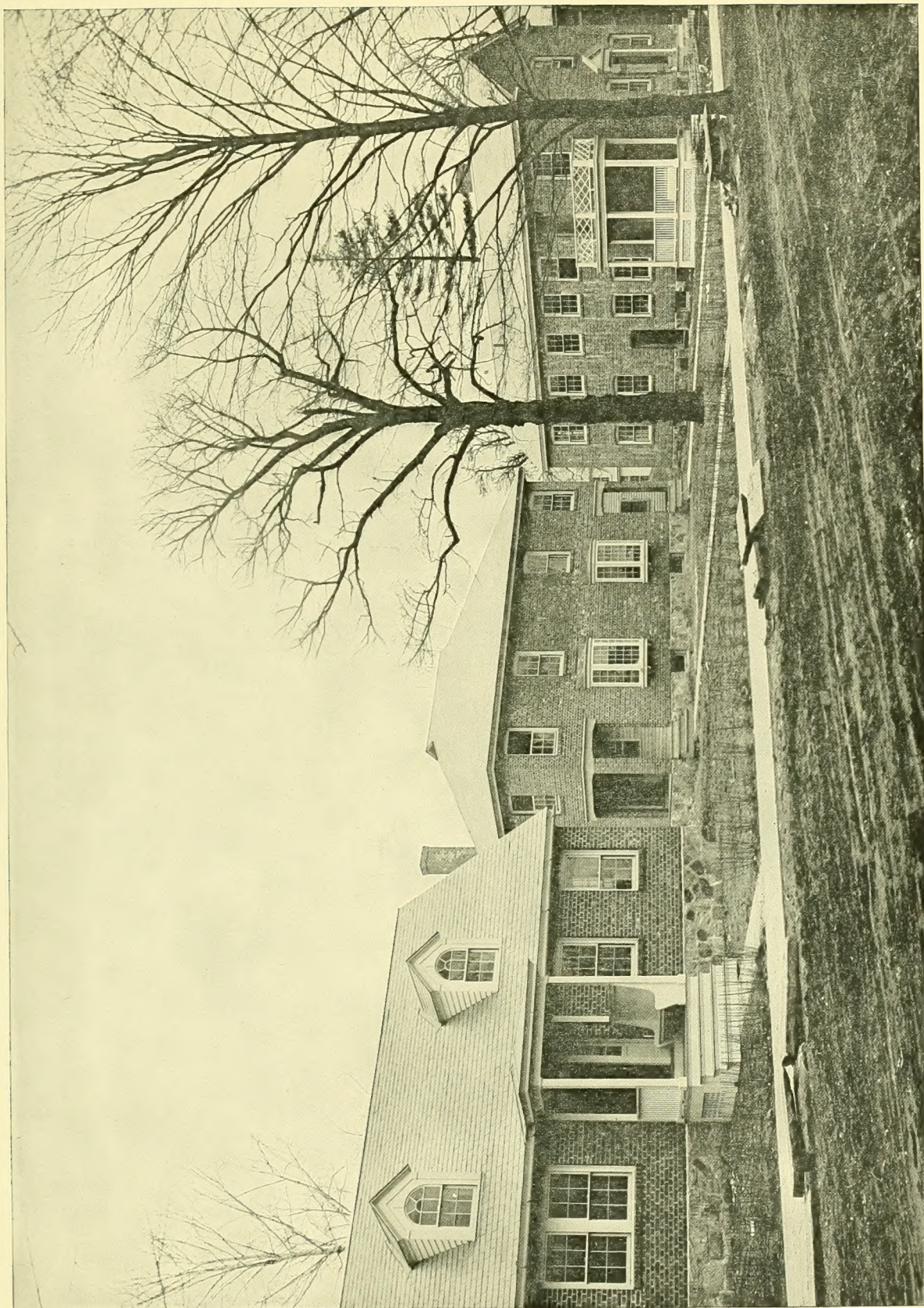
UNITED STATES HOUSING CORPORATION

VOLUME II

HOUSES, SITE-PLANNING, UTILITIES



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BRIDGEPORT, CONN., MILL GREEN SITE.

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LETTER OF TRANSMITTAL.

BUREAU OF INDUSTRIAL, HOUSING AND TRANSPORTATION,
UNITED STATES HOUSING CORPORATION,

Washington, D. C., June 21, 1919.

SIR: In conformity with section 6 of Public No. 149 (65th Cong., H. R. 10265), I have the honor to transmit herewith Volume II of the final report of this bureau. Set forth therein are those parts of the activities of the United States Housing Corporation which relate especially to the work of the Architectural, Town Planning, and Engineering Divisions, and it was prepared in advance of Volume I because the designing of houses and planning for sites and utilities, the principal work of these divisions, is practically completed.

Volume I, which will include a detailed statement of the operations of all remaining divisions, will be transmitted immediately after the Declaration of Peace.

Respectfully yours,

L. K. SHERMAN, *President.*

The honorable the SECRETARY OF LABOR,

Washington, D. C.

EDITOR'S NOTE.

The accompanying volume endeavors to set forth in as small space as practicable those activities and accomplishments of the Housing Corporation which were most directly concerned with the *design* of its various housing projects. The general procedure of the corporation is discussed merely in those aspects which more directly affected project design, and therefore, while the activities of the Architectural, Town Planning and Engineering Divisions are fully covered herein, mention is made of certain aspects only of the work of the Real Estate Division, the Transportation Division, the Homes Registration Division, and the Construction Division, and only occasional reference is made to the other divisions of the corporation, all of which are to be considered in detail in volume I of the corporation's report.

The main body of the present volume consists essentially of three parts: (1) A short general statement of how the Housing Corporation proceeded to ascertain what the situation was in the community to be aided, and how it determined what its appropriate action for relief should be in each case; (2) a necessarily incomplete statement of some of the general principles governing this kind of design which the design divisions considered in their procedure, or which they learned from their experience; and (3) a short and compact record, in plans, perspectives, tables, and text, of what the problem was which the corporation actually found in each of its important projects, and what attempt was made to solve it, as a matter of complete and reasoned design.

This volume shows by plans and other drawings as much as was possible in the allotted space about the more important projects; it states in tabular form, for compactness and ease of comparison, all the information as to the projects which it was practicable to represent by figures; and it sets down, in the text describing each project, only those facts which were of particular interest or which had a special and important influence upon the design.

The appendix contains reprints of most of the directions which were issued by the corporation as guides in design and construction, and the form of contract entered into by the general contractor.

A bibliography is included covering the most important articles on industrial housing published during the war to April, 1919, compiled by the consulting librarian primarily from the references collected for current use in the work of the corporation.

HENRY V. HUBBARD,
Editor of Volume II.

CHAPTER I.

INTRODUCTORY.

The present housing shortage not new, but accentuated by the war—Some causes of inadequate housing before the war—How the situation was aggravated by the war—It becomes the province of the Government to handle housing as a war emergency—First investigations and reports—Government action—The United States Housing Corporation.

THE HOUSING SHORTAGE NOT NEW.

The shortage of housing which the United States Housing Corporation was created to meet as a war-time emergency was not a new thing arising wholly by reason of the war. The war simply localized and aggravated a widespread, chronic, and steadily growing trouble of peace times, which still persists, and which the country must now face and deal with in general ways better adapted to the nature of American institutions than were some of the arbitrary methods of local relief adopted under the pressure of war.

It appears to be a fact that capital has for some years been more and more inclined to seek other channels of investment than housing. The individual home builder and the large operator alike have been finding it progressively more difficult to obtain mortgage loans on favorable terms as compared with the terms on which capital can be secured for other classes of investment. Rented dwellings, especially rented individual dwellings, with their many social advantages to the community because of the favorable conditions for sound family life as compared with apartments and tenements, have to be considered, on the whole, as less and less profitable investments.

The characteristically American impulse toward the making of a permanent home for the family in a place of its very own, while still strong and general, appears to be losing rather than gaining among people of small means. Especially is this true among workingmen, who feel the danger of being tied by home ownership to a limited choice of employment.

INADEQUATE HOUSING BEFORE THE WAR.

Some reasons for this are obvious. First, our modern houses cost much more than houses did formerly. Very recently all our expensive sanitary

sewerage, modern plumbing, water supply, and heating have come to be considered the essentials of any ordinary house. We no longer have cheap lumber, and the rise of wages in the building trades has been on the whole above the average of the general rise.

Small construction of any kind is relatively expensive, owing to the organization of contractors and trades on a basis of a division of labor which is economical only when applied to wholesale work. This is especially true of maintenance and repairs for the small private house.

Then, too, when managed on a small scale by an absentee owner, the rented house costs a great amount relatively for running expenses, rent collection, and loss. The advantage of large-scale running and direct supervision makes the tenement or apartment house with a janitor a more economical arrangement for both owner and tenant.

There is, moreover, often a large element of risk in owning a house, owing to the uncertainty of the future development of the neighborhood. Our districting laws are only beginning to cope with this difficulty.

These causes, and doubtless others more obscure, lie back of the unmistakable tendency toward insufficient construction of new houses, especially of private houses, to meet the growth of population.

HOW THE SITUATION WAS AGGRAVATED BY THE WAR.

This situation existed and had been getting worse for years before the war, but the war emergency showed it in a new light by emphasizing the vital relation between the housing and the employment of workingmen. When the enormous war manufacturing expansion began and a great additional supply of labor had to be concentrated in the various towns where United States contracts were placed, the housing difficulties in these localities

were at once brought to a head. The housing shortage was primarily one of quantity, but the quality of the housing was also a very important factor.

Under the pressure of appeals to patriotism and because of the rewards of high pay, a given amount of housing was made to shelter, by crowding, a much larger number of workers than usual. For example, it was a simple matter to double and quadruple the number of beds in a room. Then by having three men use the same bed in successive eight-hour shifts some workmen's lodging-houses provided an extraordinary amount of housing. Under the same pressure, boarders and roomers were crowded into private houses, families were doubled up, and rooms and houses too miserable and insanitary to find tenants in ordinary times were forced into use. Thus, irrespective of any new house construction, there was provided an increase in housing facilities to meet the sudden increase in manufacturing which came from enlargement of plants and their operation in two or three shifts.

But this increase in the amount of housing, bringing with it, as it did, a further lowering of the already low standards of health, comfort, and decency, immediately resulted in a marked loss in the average efficiency of the increased labor supply.

Increased pay and feelings of patriotism brought many highly skilled and self-respecting workers to the jobs. These men—mostly married men with families—found conditions so intolerable that they would soon throw up their jobs and move, hoping to find other jobs with less outrageous living conditions. The rate of labor turnover rose to startling proportions. The constant training of new employees entailed a great loss of time and money.

Consequently, in many places, despite unprecedented wages, with a correspondingly large unit cost of production, a point was reached beyond which there could not occur any further effective increase of the labor force. No urge of patriotism or high wages would compensate for the overloaded accommodations for individual and family life. Inadequate food, merchandise, recreation, and everything relating to family and social life outside of working hours led in some cases actually to a decrease in total production in spite of rising wages.

These conditions forced attention to the fundamental fact that industrial plant investment, including the housing of machinery and of the workers during work hours, is relatively small as compared with the investment required properly to house and keep in working efficiency the workers and their families outside of work hours.

Stimulated by war prices, or by direct advancement of capital by the Government as a war necessity, plant investment was readily and rapidly increased. The far greater investment necessary for a corresponding expansion of living quarters for the workers failed to take place for many reasons. Even under normal conditions this greater investment tends to lag behind industrial expansion. The scale of rents and of house prices relates closely to existing housing. New investments in houses built during a rising market must, consequently, compete with existing houses, disadvantageously dividing with them any increase in prevailing rental and purchase rates. Any investment in new houses is not usually paid off until after a long period of years, and thus the war increase in demand for houses offered no inducement to the investor because it was obviously not a permanent demand. Therefore, it was difficult to obtain money based on building loans; capital had been diverted from housing into channels of more profitable return, and even in the face of a great and increasing need for houses, there was a steady decline in the number of houses actually built.

Very few people recognized either the gravity or the enormous size of the housing problem as compared with the expansion of manufacturing facilities. In fact, it was beyond the physical powers of the country, in the stress of urgent demand for everything directly relating to war necessities, to create promptly an adequate expansion of housing supply in proportion to definite localized needs. If hostilities had not terminated when they did, the operation of the greatly increased program of military effort and production adopted in 1919 might have proved that the country had "bitten off more than it could chew." It is not unlikely that it might have been necessary to curtail and postpone the war production program at many points in order first to provide the housing which was prerequisite to the increased output of war materials, upon which in turn the whole program was based.



ERIE, PA.—EAST TRACT.



ERIE, PA.—WEST TRACT.

HOUSING BECOMES A WAR EMERGENCY TO BE HANDLED BY THE GOVERNMENT.

It became clearly apparent in the summer of 1917 that the housing shortage had become something with which the Government must concern itself, and which must be handled as a war emergency, since it was a great and increasing menace to the speed and continuity of production of munitions of war.

In one set of cases the problem was so clearly unescapable that there was but little hesitation in meeting it. These were the cases of some of the new industrial establishments created at the order of the Government for the sole purpose of producing munitions, namely, those powder plants, loading plants and the like which were established for reasons of public safety in isolated locations where no towns before existed. There, quite obviously, the entire facilities for housing employees and for providing some approximation to community life had to be created along with the plant. It is interesting to note that even with the temporary class of structures appropriate for short-lived communities, and even with the use of a large proportion of dormitories for men and women willing to live apart from their families while temporarily engaged in war work, the investment in housing facilities rose to large proportions in comparison with the cost of the industrial plant.

More often the war-stimulated industries formed parts of permanent communities. In these cases the problem was so complicated that it was long before a Government policy for meeting it could be formulated, accepted, and put into operation. The difficulty of balancing ultimate economic gains and losses against the necessary speed of construction, the greatly increased cost, and the reservation to war needs of every productive power of the country brought about a long and terribly costly period of hesitation.

FIRST INVESTIGATIONS AND REPORTS.

One of the first moves toward Government intervention was taken when, on May 3, 1917, Mr. Philip Hiss was appointed chairman of the section on housing of a subcommittee on labor of the Council of National Defense.

This committee reported on September 21, 1917, giving the results of a questionnaire which had been returned from 167 cities, which showed acute congestion in a number of places, notably Bridge-

port, Conn. The committee recommended that the Government undertake to provide permanent housing where possible, to relieve congestion in war-labor centers.

The following week the Advisory Commission of the Council of National Defense held a hearing on these representations and, believing them to be substantiated, recommended that a committee be appointed by the Council of National Defense to investigate further and report within 10 days. This committee was appointed, under Mr. Otto M. Eidlitz as chairman. On October 31 its report to the Council of National Defense, recommending expeditious Government action, was presented to President Wilson.

While awaiting governmental decision Mr. Eidlitz gathered together a small body of unpaid volunteer advisers and assistants and began to collect data on housing and to outline a possible scheme of procedure.

GOVERNMENT ACTION—THE UNITED STATES HOUSING CORPORATION.

On March 1, 1918, Congress authorized the United States Shipping Board to spend \$50,000,000 from its general appropriation to provide houses for ship workers as a necessary part of the expense of building ships. At first the Shipping Board made use of Mr. Eidlitz's personnel in an advisory capacity; later the Shipping Board established a housing organization of its own. In the meantime Mr. Eidlitz and his collaborators, receiving money for essential expenses from the President's emergency fund and also from the Navy, had determined on a tentative scheme of procedure, had investigated some of the most pressing housing-shortage situations, and had prepared as far as possible to facilitate the work of whoever should be finally designated to deal with the Government's housing problem.

On June 18 the President delegated to the Secretary of Labor the authority given him by Congress on May 16 to expend \$60,000,000 (appropriated June 4, raised to \$100,000,000 July 8) "for the purpose of providing housing, local transportation, and other general community utilities for such industrial workers as are engaged in arsenals and navy yards of the United States and industries connected with and essential to the national defense, and their families * * * only during the continuation of the existing war."

By Executive order, confirmed in the act of June 4, 1918, the Bureau of Industrial Housing and Transportation was created in the Department of Labor, and Mr. Eidlitz was appointed Director.

On July 25, 1918, the United States Housing Corporation, created as an executive agent of the Housing Bureau, was first authorized to expend these funds for actual acquirement of land and for construction.



CHAPTER II.

INVESTIGATING THE TROUBLE—CHOICE OF REMEDIES—DESIGNING THE DEVELOPMENT.

Requests for aid—Consultation with Army and Navy—Rating of requested housing projects according to urgency and importance—Means of relief which might make Housing Corporation action unnecessary—First investigation—Report of investigator to interdepartmental committee—Second investigation team—Report of team—Choice of means and amount of relief—The committee of designers—Cooperation—Their several functions—Procedure of designers and corporation in design—The project manager—Letting the construction contract—Procedure of designers in construction—The works superintendent—Summary—Change of procedure after the signing of the armistice—

Data collected—Value of this report as a contribution toward the solution of a national problem.

As soon as we had in the Housing Corporation actual authority to spend money in construction, most of the war industries, where there was a labor shortage or high labor turnover, asked for aid very promptly. Many cases, indeed, which were not within the province of the Shipping Board, were already waiting to be taken up, and some especially urgent cases had already been considered and decided in a preliminary way, when the Housing Corporation finally received its appropriation.

We soon had, therefore, a reasonably complete list of what war industries were said to be suffering from lack of labor. Then we inquired from the War Department and the Navy Department how important these industries were in war preparation. If not pressing, their cases were postponed; if very important, we took up their investigation at once.

MEANS OF RELIEF—FIRST INVESTIGATION.

We sent an investigator to the town to bring back answers to the following three questions: (1) How great a labor shortage did there appear to be? This was a check on the reports from the industries themselves. (2) How far was this shortage due to lack of housing facilities and how far to other troubles, such as bad working conditions and lack of amusements? If the trouble was not in the scarcity or inaccessibility of houses it was not our business to help it.¹ (3) If the labor shortage, present or expected, was due to some kind of insufficiency in housing, could it be helped by putting more of the existing rooms and houses into the

market, by providing transportation to houses now hard to reach, or by building new houses? And, roughly, what provisions of any or all of these kinds would meet the case? The investigator spent several days on the spot. He got from the manufacturers concerned, who were having trouble in maintaining labor supply, information as to the kind of workers employed, the wage scales and labor turnover in the different classes of workers, and other information as to the conditions at the manufacturing plants. He consulted with the labor leaders. He got in touch with the civic organizations to get some idea of what and how many people already needed help. He made visits to the dwellings of employees, and talked with the men and their wives, to see how they were living and how contented or discontented they were with their conditions.

INTERDEPARTMENTAL COMMITTEE.

The investigator read his report to the Chief and the division heads of the Corporation, meeting with representatives of the War and Navy Departments; and after full discussion, if the need proved to be sufficiently great in relation to other war needs, an allotment of money was made to be spent in relieving the trouble as far as possible. Before allotting money for the construction of new houses, however, the joint committee considered whether the situation could not be met, wholly or in part, by any of the less expensive expedients such as placing the war contracts elsewhere, encouraging private enterprise in home building, throwing open all present housing, and making more housing accessible by transportation. Only the difficulties which could not be overcome in any of these ways were met by new house construction. Since the

¹ We did, however, make suggestions to the proper authorities and occasionally stretched a point to meet an urgent need associated with housing troubles with which no other Government authority was able to cope. For example, we made plans for an emergency hospital for contagious diseases at Washington.

total funds of the corporation were not a fifth part of what it would have cost to build all the war-workers' houses which seemed to be really needed in the country, we could in any one place only take off the worst of the burden. Under these circumstances, we were usually able to make some estimate of what would probably be the labor and housing conditions in each place after the war, and to plan to build no more permanent houses than would be still useful, and therefore valuable, at that time.

SECOND INVESTIGATION TEAM.

It being thus determined in a general way what and how big the problem was, a real estate scout was usually sent to the town to prepare a preliminary report on the real-estate situation in the town, and on the probable value of the tracts of land most available for our development. Immediately after receipt of his report—indeed often meeting and collaborating with him on the ground—a “second investigation team” was sent out, composed usually of one man each from the Architectural, Engineering, Town Planning, and Real Estate Divisions of the corporation. A man from the Transportation Division was sometimes added to these, or sometimes went alone, according to the case. At the same time, if not before, the Homes Registration Division started its campaign to list all vacancies at a central office and to open to the workers all vacant houses and rooms previously held out of the market.

Arrived at the town, each member of the “second investigation team” took up his own work. The architect found out what he could as to the kind of houses most practicable to build, and the kind that the workers would like. He talked to the workers and especially with their wives, and got some idea of how and where they wanted to live; he talked to the employers and got a statement of the wages paid, from which the rent to be expected could be reckoned; he talked to citizens generally, and kept his eyes open as he went about with the rest of the team. He also investigated local supplies of building material, labor conditions in building trades, and similar construction problems. The transportation man learned about the street-car lines and the railroads, what housing areas they made available and how efficient was their service. The realtor found ready for him, or soon obtained, the appraisals of property by the real estate scout, and later there were available detailed appraisals

of the required land, prepared, at the request of the Real Estate Division of the corporation, by the mayor, the local real estate board, the Rotary Club, and the assessor in cooperation. Using this information the realtor advised as to the practicability of each site for building-investment purposes. The engineer studied the water supply and other utilities of the city and its different sections, considering what new construction was needed on each site, and what arrangements, if any, would be necessary with the municipal authorities as to construction and upkeep to incorporate the additional utilities into the municipal system. The town planner weighed relative advantages of different neighborhoods, such as accessibility, ease and economy of subdivision, attractiveness, and suitability of topography and soil. The committee as a whole studied each proposed housing site, and made notes of its total relative advantages of cheapness, accessibility, ease of development, and appropriate type of houses. Often the committee met again in the evening and discussed their results for half the night. After two or more days of this concentrated work, depending on the size and complication of the district, they were usually ready to report their recommendations as to what kind of houses should be built, what site or sites should be chosen for the houses, and what transportation, if any, to the factories or to the town should be provided from these houses or from any others to be made available.¹

The report of this investigation was perhaps the most important move which was made on each project. The corporation chiefs at Washington reviewed the report, of course, but they would seldom reverse the decision of those who had actually studied the job at first hand. The choice of site, entailing subsequent negotiations for purchase, or perhaps requisition proceedings, required on the part of the realtor a keen sense of what makes real estate values. The possibility of developing the site had to be determined before any choice could be made, and this meant that the engineer and the town planner had to work out enough of a tentative scheme of development to be sure that the site could be quickly and economically drained, sewered, provided with water, graded, and made accessible by streets. It speaks well for the men who did

¹ For a more complete idea of the technical details of these investigations see Instructions (Appendix, p. 437).

this work under so much pressure, that very seldom has the corporation afterwards repented of the decision of its investigating team.

THE COMMITTEE OF DESIGNERS.

When, after hearing the report of the second investigation team for a project, the corporation had determined what sites to choose and what housing and transportation to provide, the next move was to appoint the committee of designers. This committee consisted normally of an architect, an engineer, and a town planner.¹

The architects were chosen by the general manager of the Housing Corporation, the engineers and the town planners by the Engineering and Town Planning Divisions, respectively, subject to the approval of the president of the corporation, for their professional qualifications for the particular job, and as far as possible to supplement each other, and among them to cover the whole field. One of them was made chairman, and held responsible for the quick and efficient working of the committee. In effect they were made a firm with a senior partner, responsible jointly for a complete solution of the problem set before them.

They were called to Washington and given all the information which the corporation had gathered on their particular project. Also they received the "standard" or type plans and directions issued by the corporation for engineering, town planning, and architectural work, and definite printed directions as to the procedure of the committee and the responsibilities of each designer.² Each designer reported to the corporation division in charge of his particular work, and was initiated into the ways of the corporation as far as possible in a day or so, before the committee returned to their offices to begin work. Either the town planner or the engineer, according to the particular case, was made responsible for securing a topographic map of the site, as quickly as could possibly be done. In the few cases where we had no boundary plan of the land, the surveyor usually ran the boundary lines first, so that the Real Estate Division could accurately appraise the land, on the basis of a plot approved by them and by the Town Planning Division.

The committee of designers were required to prepare preliminary plans and estimates showing the development which they proposed, and to submit them personally at Washington so that any conflicting opinions or doubtful points might be discussed and settled there and then. The Engineering Division appointed from its staff district engineers, each responsible to the chief engineer for the work of the Engineering Division on a certain group of projects. The Town Planning Division similarly appointed district town planners. The Architectural Division, however, divided its work into various branches such as heating and ventilating, electrical work, plumbing, specifications, construction, and design, and different men in the division were primarily responsible each for some one of these branches. The representatives of the various divisions in the corporation who were concerned with the same project thus saved a great deal of time by knowing whom to ask for any particular kind of information on any job. When the committee of designers came in with their preliminary plans and estimates, each designer first checked over his own plans with the representative of his own division. Then the endeavor was made in general conference to be sure that there were no inconsistencies, overlaps, or omissions between the work of the respective designers.

When the preliminary plans and estimates had been approved, after having been changed as much as the corporation saw fit, the designers went back to their offices, to work up the plans in detail, and to report again in Washington for a similar final inspection and approval, after which the plans were ready to go to contract. On a few projects all the designing was done by the staff of the corporation without using outside offices. On some others certain features were designed in this way because special circumstances made it more convenient.

In the meantime the Real Estate Division had sent out a negotiator from its staff, who, keeping in touch with the committee of designers, began the acquisition of the land which proved to be necessary for the design as finally approved.

THE PROJECT MANAGER.

The corporation appointed, at about this stage in the progress of each job, a project manager whose business it was to be fully informed on all matters pertaining to his project, to discover and eliminate causes of friction and delay, and in gen-

¹ See "Instructions to Committee of Designers" (Appendix, p. 444) for the exact functions of each of the designers.

² For standard plans, see pages 51-63, 471-491, 501-504. For standard instructions, see Appendix.

eral to see that the office organization of the corporation and the designing and construction of the project were kept in efficient cooperation.

LETTING THE CONSTRUCTION CONTRACT.

Contracts for construction were let by the Construction Division of the corporation on the basis of competitive bids for the whole job, by general contractors. The form of this contract, like that of the contracts with designers and the other legal agreements entered into by the corporation, was determined by the Legal Division so as to be in accord with the provision of the Housing Act and to meet the desires of the corporation divisions concerned in each case. These contract forms were simplified and standardized as far as practicable.¹

In a few minor cases it was found practicable to let lump-sum contracts, but usually the contractors would not bid in this way except at prohibitive figures, on account of the uncertainty of labor and material costs. Our usual procedure was that the contractor stated his estimate of the total cost of the work, including all expenses; his bid for his fixed fee, covering his own time, skill, and organizing ability; interest on capital; profit; the organization with which he was prepared to do the work, with a schedule of salaries; his bid for plant rental and the plant to be furnished; and the length of time within which he agreed to finish the job. Low estimate of cost of work, low fee, good reputation, good equipment and personnel, short estimate of time to complete work, each counted a certain number of points toward a total which determined the selection of the contractor. In the meantime the Requirements Division of the corporation had prepared an itemized estimate of the cost of the proposed buildings, which was used as a standard to check up the bids. The materials, at a fixed price, were usually purchased through the Construction Division of the Army, the prices being stated to the bidding contractors. The contractor usually agreed further, that if the final cost exceeded his estimate, his fee should be reduced by one-quarter the amount of such excess, though not below a minimum of one-half the fee first agreed on; but on the other hand, in all cases, if the cost was less than his estimate, his fee was increased by 25 cents for

each dollar he saved, up to the limit of an extra payment of one-half his fee, provided that the time limit, as originally fixed or later extended, had not been exceeded. His expenses, as per carefully checked vouchers and pay rolls, were reimbursed to him by the corporation.

PROCEDURE OF DESIGNERS IN CONSTRUCTION—THE WORKS SUPERINTENDENT.

When the work was actually started in construction, the committee of designers nominated a works superintendent, who, when approved and appointed by the corporation, became the representative of the corporation on the job, supreme in authority as to construction. The committee of designers acted toward him thereafter in an advisory capacity as to design, giving no orders themselves on the work, but in cases of important disagreement, reporting the case to Washington for settlement. On every important job each designer was required to have a personal representative on the ground to help the works superintendent in carrying out the plans and to keep the designer in touch with the work. The works superintendent had under him a force of inspectors and checkers through whom he issued instructions to the contractors. In many cases, especially in engineering work, the designer's representative was used also in the capacity of inspector by the works superintendent. The designer himself was supposed to pay personal visits to the work frequently enough to be thoroughly informed of what was going on.²

SUMMARY.

It might seem from the above short and incomplete statement of the procedure of the corporation that all this machinery was carefully set up beforehand, and that it always worked as set up, without friction. Such was not the case. Much of the procedure was worked out as we went along, and came to its full form only after some time, which we believe made it better for its purpose. There were occasional misunderstandings, conflicts of authority, and duplication of fields of work, but on the whole one of the most striking accomplishments of the corporation was that through a necessarily complicated cooperation of many hundreds of people who, for the most part, had never worked together

¹ For form of construction contract see Appendix, p. 519. For further details see also Vol. I of this report.

² For corporation Instructions to Field Staff see Appendix, p. 515. The details in regard to the methods of disbursement, accounting, and control of contractors' operations are fully covered in Vol. I of this report.



ROCK ISLAND DISTRICT, MOLINE, ILL.

before, with almost no delay due to personal friction, it produced in 109 days, from July 25, 1918, to November 11, 1918, completely worked out plans and specifications for 83 projects, for 60 of which, involving an estimated expenditure by the Housing Corporation of \$63,481,146.65, construction contracts had already been let on November 11.

AFTER THE ARMISTICE.

With the signing of the armistice the whole outlook of the Housing Corporation changed. In a considerable number of projects the demand for houses would persist after the war. When this was the case and we were already well along in construction, it would save money to go on and complete the houses for rent or sale. In some projects, however, the demand for houses would cease with the war and on all these work was promptly stopped. In such places we had usually planned temporary houses, knowing that they must ultimately be scrapped. In many other projects we had not proceeded far with our construction, and it saved money to stop, scrap what we had done and take our loss, rather than to go on and try to get back from sales or rent after the war the cost of houses built at the abnor-

mally high prices of war times. How far this stopping of house building was desirable in a broad way, in towns which still very much needed houses, is another question; but it should not be forgotten that the Bureau of Industrial Housing was created and organized to meet a war emergency, not to solve the general problem of industrial housing in the United States, however desirable this latter result may be.

DATA COLLECTED—VALUE OF THIS REPORT.

The United States Housing Corporation, in serving its war purpose, has produced and compiled, as a by-product of its activities, a collection of data which, with the similar material in the hands of the United States Shipping Board, is by far the largest and best organized collection of information in existence on contemporary American industrial housing, town planning and related matters. This volume of the report of the corporation sets forth in brief compass one aspect of what the corporation has done in a war emergency; but it also calls attention to this collected data so that the public may have access to it for use in attacking again the housing problem, no less important in the coming times of peace.



CHAPTER III.

MUNICIPAL UTILITIES.

Our present standards in municipal utilities are of very recent growth—These utilities the result of scientific study and experience—Fitting the utilities of a new development into the general scheme of the community—Negotiations for public utility contracts—Corporation engineering standards and formulated directions.

Within the memory of men now living there have been developed in the modern urban and suburban community many new domestic conveniences almost if not entirely unknown in the past. So complete a change has been made in habits of life, standards of comfort, and methods for convenient living that it is difficult for the present generation to appreciate that the larger part of this advance has come about well within the last 50 or 60 years.

There was a time when every man's house was his castle—dark, damp, foul, unheated, ill lighted, and entirely shut off from the outer world. To-day, the thoroughly modern urban dwelling is, so to speak, only one biological cell in the larger pulsating organism of the community, every dwelling in common throbbing with light waves at night and power current by day; having a wellspring of pure running water in any room that needs it; connected by instant speech with every neighbor within hundreds of miles, provided with means for the instant removal of all offensive wastes and their final proper disposition; perhaps even heated from a common civic source; and having well-lighted, hard-surfaced local carriageways for engine and horse driven transportation, as well as convenient footways,—all this being provided through the agency of the municipality or through skillfully planned central production; and having also long-distance transportation so cleverly adjusted to its work that commodities and services from all over the world are conveyed to and from each house without care or anxiety to the owner, and at an expense far less than he could personally provide them, were it possible for him to provide them at all.

Even in the United States for a long time after the Civil War the smaller cities and towns of the country were generally unprovided with public water supplies or sewer systems; streets were unpaved, and wooden sidewalks were a luxury; cesspools were common; only a few of the wealthy knew the advantage of a bathtub; and public lighting was

generally by kerosene lamps in the larger cities, or by the flicker of sparsely provided gas lamps.

About 1850 modern systems of water-carriage sewers began to be scientifically studied and introduced, at first only in the larger cities like London, New York, and Chicago. But early progress was slow, and the smaller towns of the United States and Europe did not generally provide facilities of this kind until after 1880 or 1890.

Public water supplies although ancient in origin, for example, those of Rome, were, nevertheless, ordinarily confined to a few of the larger and more wealthy cities of the Old World for many centuries. The four or five largest cities of the United States introduced public supplies only in the first part of the last century, and the rapid growth of community water supply as now practiced did not take place in this country until after about 1880.

Gas for street lighting came into use early in the last century, but only for the larger cities. Kerosene street lamps were common in the United States up to 1890 and even 1900, and in some localities still survive. Electric light was introduced in 1885 to 1890, but did not become general until after 1900.

The telephone was invented about 1877 and was not extensively introduced until after 1900. Electric transportation has coincident origin. The rise in the common use of these facilities has been well-nigh marvelous.

The automobile, with its insistent demand for good roads and pavements, was born with the twentieth century. Good pavements were not usual in the smaller cities of this country much before 20 years ago, and while now largely introduced, are still the greatest need and the largest single item of construction expense of the modern town.

To-day the small town of two to five thousand population, and over, that does not have an up-to-date system of water supply, a scientifically devised

sewer system, a sewage treatment plant when needed, a system of garbage removal, electric lighted streets and alleys, telephones, modern pavements, cement curbs, sidewalks, a "white-way," ornamental lamp posts, adequate fire protection, and police and fire alarm systems is not considered as being progressive or up-to-date.

So accustomed have we become to these conveniences in the United States, even in the smaller cities, that it is interesting to note that our average soldier boys, drawn from modest homes in the smaller towns, villages, and country all over the United States, complain of unheated houses and lack of sanitary appliances and running water in their billets in the smaller cities and villages of France, where such conveniences appear to be not yet introduced.

UTILITIES RESULT OF SCIENTIFIC STUDY.

All these modern conveniences are the result of an era of intensive scientific study and invention. As we now know them, public utilities are the outgrowth of expensive tests, rejected theories, experiment, large expenditures for obsolescence, ingenious patented and unpatented invention, discussions by technical experts, and repeated trials and failures. Several generations of mechanical and municipal engineers, biologists, and public health experts, thousands in number, have devoted their lives and efforts to perfecting and completing the mechanical appliances for transportation, lighting, power, sanitation, and minor conveniences of the modern community, and the result of their work has come to be in large part standardized, although progress is constantly being made.

The term utilities in connection with municipal matters has come to mean transportation facilities, water supply and sewerage, all piping and wiring, and all such forms of improvement rendering service to the community, whether these utilities be installed by the public or delegated to private enterprise. In a general way the public agency will install those utilities which are of the simpler forms and particularly those for which no direct revenue is received, while private enterprise is usually charged with the duty of installing the more highly specialized production, requiring skilled management.

From what has been said of the highly complex arrangement which public utilities require, it will be perceived that it is no mean task to create central production and distribution, especially for

smaller developments, for even in small towns it takes a good deal of skill and business ability to keep such utilities from being unduly expensive. It is probable that in most housing projects the cheapest form of utility service which can be obtained is that in which the business management and proper design and maintenance have been already fully established, and from which extensions can be made without undue burden on the consumer.

NEW UTILITIES—NEGOTIATIONS FOR CONTRACTS.

When the United States Housing Corporation came to consider the utility problems of its various developments, it was plain that a very important part of the work of the Engineering Division in the corporation would be negotiating with the municipal authorities in each case, to determine how best to fit our new construction to their existing facilities, and how most fairly to share the costs.

Negotiations for public utility contracts have required municipal engineers who have had long acquaintance with municipal practice, customs, precedents, laws, special assessments and other methods of financing, as well as good practical working knowledge of proper design, sources of water supply, sewage treatment and disposal, electric light production and marketing, gas, telephone service, heating, street paving, storm water removal, and other of the varied responsibilities which fall upon the designer of the modern city. These negotiations have been carried on for the Housing Corporation by the Engineering Division direct, except in some cases where the engineer member of the committee of designers or some special expert was delegated to do this work.

In the course of the work questions of finance were, of course, important. Municipal corporations were asked to treat the housing developments in all respects the same as though they were the property of private syndicates engaged in the development of housing. Even on this theory practice varied very much in different places, so that different kinds of financial aid were given and received by different localities, depending on their custom. In the case of privately owned utilities the same principle prevailed with the exception that in their case much aid in a financial way had to be extended through loans to them from the Housing Corporation because of the war-time difficulties in the way of floating bond issues. The question of

fair rates for utility service was one which was usually settled by the established ordinances and contracts of the existing municipality or through public utility commissions which already regulated, revised, and supervised such rates. The total amount raised by suggestion and negotiation of the Engineering Division from municipalities and utility companies for United States Housing Corporation requirements has been \$4,702,700, or 36.2 per cent of the total requirements of \$13,040,134 estimated utility expenditure.

In the work of the United States Housing Corporation in its one hundred developments, more or less, which reached the engineering stage, it has been interesting to note the widely varied methods and precedents which exist in various localities, as to the method of apportioning utility cost, the standards of construction adopted, the rates for utility service, and the standards of operating practice.

HOUSING CORPORATION ENGINEERING STANDARDS.

Early in its work the Engineering Division of the Housing Corporation formulated directions¹ to the designers of its utility improvements in various localities, but at best this could only mean that it would exclude from a rather wide range of method such practice as would clearly seem to be either unduly expensive or improper and unsanitary, and it was early noted that the local designer of municipal utilities must be allowed a rather wide range of opportunity in which he could adapt his design to the precedents and the practices of the immediate locality in which he was to operate, particularly where those practices and precedents were not seriously incompatible with wise sanitary regulations, economy, and good municipal practice.

In a few cases where developments were located entirely outside of any municipal boundaries, original design could be introduced, and there was opportunity in some cases to install better and more scientific methods than already existed in the adjacent municipality. But in those cases where it was possible to do so municipal or private utility companies' distribution systems were extended into the development on the same basis and under the same terms in accordance with which they were serving the adjacent municipality, for although some of the developments of the United States Housing Corporation were so extensive as practi-

cally to make towns by themselves, three was and could be in the future no incentive for the Government to engage in the utility service business or commit itself to a program which involved long continued operation of highly specialized utility management.

A distinguishing characteristic of the program for utility installations was the separation of all utilities into two groups: First, those which were absolutely essential to the necessities of the householder, educated as he is in the use of modern improvements, and second, such utilities as could be deferred for the time being, on account of the war emergency.

Thus, it was deemed absolutely necessary always to install water supply, and sewers, or some satisfactory cesspool system in a few special cases. It was highly desirable to have street lighting and sidewalks, but often the natural soil and drainage were such that street paving could be deferred, and as this was usually about one-half of the total utility expenditure it gave opportunity for keeping utility cost temporarily down to a moderate and reasonable sum. Full-width sidewalks, full-width streets, and curbing were also utilities which sometimes could be profitably deferred. Gas was usually optional, and its introduction was somewhat dependent on the custom of the communities involved. Telephones were almost always left to optional introduction by the telephone company. Central heating plants were not encountered and only occasionally introduced.

In the negotiations and contract relations necessary in providing our developments with public utility service some definite principles had to be laid down both as to cost of production and efficiency of service. Capital cost and cost per family were the predominating factors. These matters were clearly of greater importance in many cases than the question of detailed design of the utility distribution systems themselves, although in most cases the latter had to be given careful attention, not only by the designing engineers of the corporation but through cooperation with the municipal engineers of the adjacent or including municipalities.

In the work of the Housing Corporation there were no technical engineering problems which had not been met before. No advances were called for or attempted beyond what was already accepted as good engineering practice. But it was

¹ See Appendix, p. 449.



PUGET SOUND NAVY YARD (BREMERTON), WASH.

essential, so far as the local circumstances of each project admitted, that detailed design should be standardized, and particularly that the general conception of what is good design should be constant throughout the work.

Therefore the Engineering Division prepared and distributed a set of instructions to engineers, setting forth in a general way what we considered for our purposes good practice in design and in construction of public utilities and road surfaces. These

are printed in full in the appendix to this volume—pages 449 to 470.

Certain measurements of utility constructions for most of the projects of the United States Housing Corporation are tabulated with other information on the projects in Chapter IX of this volume. In connection with the plans here shown these data can be used advantageously by engineers for comparative purposes to save time and labor in preliminary cost estimates of proposed schemes.



CHAPTER IV.

SURFACE IMPROVEMENTS.

The work of the Housing Corporation in relation to surface improvements—Clearing the ground—General grading and surface drainage—Lot and block grading—Streets—Street planting—Lot and block planting—Fencing—Preparation and coordination of plans; grading, utility, and architectural plans, planting plans.

It proved to be convenient, in the particular problem of the Housing Corporation, to entrust to the Town Planning Division, besides its work in general town planning design, the duty of considering all surface improvements and making suggestions as to their appearance, and the further responsibility for the detailed designs and specifications for certain of these improvements.

It is evident that this required the closest cooperation between the Town Planning Division and the Engineering Division. Road surfaces, street railways, sidewalks, curbs and gutters, street furniture, while they are all things to be considered when designing the general living conditions and the general appearance of a community, are all engineering structures which must fit their economic uses. Our arrangement was, therefore, that such features should be checked by both divisions, the engineers being especially responsible for the construction details. In regard to the general grading, surface treatment of lots and blocks and planting strips, preparation and cultivation of the ground, and planting, the detailed technical experience of the landscape architects in the Town Planning Division was available. These features, then, were entrusted directly to the Town Planning Division.

The more general and more important aspects of the work of the Town Planning Division are elsewhere mentioned.¹ In the present chapter we are discussing merely certain details of the treatment and appearance of the surface of the ground which came especially under the direction of that division and which should be more generally considered in industrial housing developments than has hitherto usually been the case.

CLEARING THE GROUND.

The preliminary work of clearing the ground of trees and other things which would be in the way

of operations had to be provided for carefully. A reasonable number of good-sized trees already in place when a housing development is ready for occupation make a notable difference in the attractiveness and marketableness of the homes. And while it may cost little to leave such trees if they are there in the first place, it would cost altogether too much to move in trees of such a size if none were found or none left. Unless trees are protected they will almost certainly be destroyed by gnawing horses, or hubs of cart wheels, or derrick tackles. We provided therefore that all trees of any importance not directly in the way of construction should be protected, and later cut out, if at all, only by specific direction of the town planner.

GENERAL GRADING AND SURFACE DRAINAGE.

The general grading on any project was closely bound up with the street design. On flat and gently rolling ground the surface of the roadways was placed about even with the natural surface, and the material excavated from the street sites and the house cellars was used to allow the houses to be set well above the street for drainage. On uneven ground we had to consider how to avoid steep streets and very crooked streets. The slopes transverse to the streets had to be taken into account, so that the houses on the uphill side should not be too high above the street, and the houses on the downhill side should not be below the street, or be on a deep fill.

In smaller detail the grading had also to be studied in relation to the floor levels of the proposed houses, so that groups and rows and single houses adjacent or on opposite sides of a street should be practically and pleasantly related.

Throughout we had to avoid cutting or filling large quantities of material, and in any case we had to arrange if possible that the material which was cut, including that coming from the cellars, would be just sufficient to supply all the areas needing to be filled.

¹ See especially Chapters VI and VII.

The surface grading and the design of the sewers were closely interdependent. Judicious grading might so provide for the surface flow of storm water as greatly to reduce the required amount of storm drains. Properly studied street profiles might save much extra length and extra depth of excavating for house sewers.

All this modeling of the ground was intended to be so carried out that water flowing over the surface after rain should get quickly and completely to a gutter or other proper means of escape, without standing in puddles, flooding cellars, or making sidewalks impassable. It seldom happened that a housing site was chosen which was so wet that it needed agricultural tile drainage. Where this was to some extent the case the drying due to quicker surface drainage in the completed development, together with the effect of the various pipe lines and trenches put in for other purposes, was usually relied on to remove any great excess of water.

It had to be specified that in these grading operations the fertile topsoil capable of growing grass and trees should be separately handled and replaced on top of the new grading. Sometimes, of course, the necessary sequence of operations made this inexpedient. Occasionally, indeed, there was no topsoil or loam worthy of the name, but in most cases some foresight in this regard saved buying much loam elsewhere and hauling it in at a high price.

LOT AND BLOCK GRADING.

The grading work on a project almost always was carried out in two operations: First, the rough grading over the whole project wherever necessary, including subgrading the roads, and when possible, including also digging the cellars; and, second, the finishing and detailed grading on the lots, planting strips, etc., including providing proper topsoil for lawns, shrubs, and trees. Plainly this finished grading must come after the houses are practically finished, but it must be exactly planned for at the beginning, because setting the floor levels of the houses and modeling the ground around the houses are both parts of the operation of fitting houses and lots to the topography and to the streets, and neither can be determined independently without almost certainly preventing the best handling of the other. In a general way we endeavored to set the floor level of the houses high enough so that the ground surface, when properly

related to the house, should slope down from the house to the street, draining the front yard across the sidewalk into the gutter. The drainage of the back yards and the interiors of the blocks depended upon circumstances. If the water ran between two adjacent houses into the street, a sufficient depression was made to insure that no cellars would be flooded. The gutter of a private drive often served a good purpose in this case. If the surface water ran toward the interior of the block, a public alley sometimes did good service either to collect the water to an interior catch basin or to lead it readily into the street gutter.

When possible, we avoided steps in the entrance paths to the houses. Even a little crookedness in the paths was allowed, and a slope of as much as 10 per cent, instead of steps. When steps were unavoidable we grouped them and made them gentle enough so that the bank could run parallel with them and not be too steep to be kept in turf. In most cases we preferred to avoid formal banks, particularly banks only a few feet high, and we used instead various irregular modelings of the ground as being cheaper to build and much cheaper and better looking in maintenance with the amount of care that they were likely to get. Of course, where the bank was necessarily very high and very steep, a straightforward formal slope was often the best. When, however, a site was so steep and rough that most of the houses would require high banks or, still more costly, retaining walls in front or behind, the probable delay and expense entailed in construction of all kinds, as well as grading, was apt to be so great that some other site less picturesque but more available was preferable, even at greater cost for the raw land. This was especially true of our developments, because to save expense the houses had to stand close together, and there was no room to make much adjustment of grade between adjacent buildings.

STREETS.

The width of the streets and the amount of space to be devoted to roadway, to planting strips, and to sidewalks was a question to be settled in each case only after considering the traffic requirements, the requirements of light, air, and outlook for the houses fronting on the street, and the appearance of the street to those who were to travel on it.¹

¹ See especially Instructions to Engineers, Appendix, p. 449; suggestions to Town Planners, Appendix, p. 497.

For motives of economy we made the roads as narrow as possible, but we placed the street trees so that the road could be later widened. We paved the roadways as cheaply as we dared, thus postponing expense until after the war. The exigencies of war construction made it impossible to consider matters of color and texture of road surface. Sidewalks, since they had to be made at once wide enough for all local foot traffic, were usually wide enough for any use of the immediate future. A less good material than cement concrete for sidewalks was seldom advisable.

Usually we had little chance to determine or to change the arrangement of such street railways as ran through our projects, for the street system or the railway system or both were already fixed. In some cases, however, we put the tracks in parking strips in the middle¹ or along the side of the road.² This has the advantage of allowing somewhat cheaper track construction. This arrangement is probably the best in appearance when the tracks are on a middle reservation, wide enough to have two rows of trees with the tracks between on turf or on a ballasted road-bed with hedges on either side.

Since we made it a rule that all alleys were to be public ways, paved, lighted, and policed, it became necessary to pave them at least as well as the roads, because they were so narrow that all the traffic wear came on the same lines. We found that usually the best alley pavement was concrete, with a concave section for letting the water run in the middle of the alley. Foot traffic through the alley could usually be accommodated without any special sidewalk.

In a few cases as a matter of economy—often, we hoped, only until after the war—we planned turf gutters in the planting strips to carry the surface water from the roads.² In a sparse or rural development this is often the best practice, and the somewhat rough edges of the road are in accord with the surroundings. In a closely built up suburban development—as most of ours were—the grass gutter is likely to look too ragged, to be cut into by wheels, and to be difficult to arrange at sidewalk crossings and street corners. The cobble gutter gives a more definite line along the road, it should not wash out, and its irregular edge allows water to come into it from the road and from the planting strip without washing out a line just along-

side the gutter paving. Usually when we used a cement concrete gutter we combined a cement curb with it. This is much cheaper than a curb and gutter separate; it makes a neat and definite line bounding the roadway, and it enables the water in the gutter to run conveniently past sidewalk crossings. It is best used with a road surface at least as good as bituminous macadam, for with a softer surface the joint between the road and the gutter is a weak line, washing or wearing out with great frequency. To save money by avoiding underground pipes we carried the surface water in the gutters as far as possible, up to a maximum of 1,000 to 1,500 feet.³ The limiting factor is, of course, that the gutters, if they are made large enough to carry the flow coming into an excessive length, get so large that no one can step across them when they are full of water.

We endeavored to insist, in every case, on neat and accurate curb work on straight streets, and careful attention to smoothness of curvature of street surface, and especially of curb lines, both horizontally and vertically, on curvilinear streets. Good lines cost more than poor lines only by requiring more careful definition on plan and more painstaking supervision, while the difference in their effect on the appearance of the whole scheme is surprisingly great.

In the design and choice of street signs, lights, hydrants, etc., we have done practically nothing new. The necessity for both economy and speed made it desirable to use stock material, and all we could properly do was to choose the simplest and best-looking form which was readily available.

STREET PLANTING.

We usually placed the planting strip between the sidewalk and the street, because, among other reasons, this allowed later widening of streets or sidewalks, and allowed a grass gutter or a ditch which might be later replaced by a gutter of a more permanent material with or without a curb. On broad streets, the planting strips were far enough apart to allow for the growth of trees set opposite each other, and to keep the trees far enough away from the houses, making of the whole street between house fronts three aisles, the center for the roadway, the sides for the walks and front yards. On narrower streets the trees were sometimes given more space by being staggered—(see p. 335).

¹ See Cradock, p. 273.

² See Briarfield, p. 258.

³ See Instructions to Engineers, p. 452.

The relation of street trees which particularly took study, however, was the enframing of the more important buildings, as for instance those standing at the end of a vista down a street (see p. 243), and the relation of the trees to automobile entrances present or future, without departing too far from a reasonably constant spacing of trees along the street. These considerations tended to make it desirable to choose a spacing of trees which brought them generally opposite the lot lines except where automobile entrances were planned on the lot lines to serve two houses. Street trees were usually not placed on street corners, because the planting space there is often insufficient and because the corner is the best position for a street light, which would be obscured by the tree.

LOT AND BLOCK PLANTING.

In a sense, planting in a housing development is not essential; that is, it is possible to get to and from a house and to live in it without having to spend any money on trees or other plants. On the other hand, the natural pleasure that everyone takes in seeing something green and growing is so great that there is no expenditure which adds proportionately more to the desirability and so to the selling price of a development than a reasonable investment in trees and shrubs and turf. It is true that the newly planted trees will be small, but the householder, like the designer, sees them with the eye of hope, and feels that at any rate everything has been done that is reasonably possible in this way to make his home and his neighborhood complete. The corporation included in the contract for every project a sum that was thought enough to cover proper preparation of the ground, cost of plants, and planting.

On streets where the front yards were shallow the street trees were often all the trees for which there was room in front of the houses. Where the depth of the set-back of the houses allowed it, however, we often planted trees in the front yards. With all ordinary widths of lot, 40 feet or under, one tree per lot in addition to the street trees was considered enough. We thought it better to vary the kind and arrangement of trees in the front yards, thus increasing the individuality of the lots.

Behind the houses there was often room for two or three trees per lot. We used some shade trees, and often a few fruit trees, making the planting

different from lot to lot, and endeavoring not to put the trees in the way of future garage entrances, or so as to cast too much shade on the garden or the clothes dryer.

Shrubs were set out very sparingly. We seldom concealed the whole of the base of the house with them, and we usually planted the shrubs well apart, using a considerable proportion of single "specimens" instead of shrub masses.

We used a few vines on the porches of the houses, and on lattices and fences where a screen was desirable. A choice of different kinds gave an easy way of getting variety from one house to another.

Hedges were sometimes called for as a means of decorating and unifying the front yards along a street, but we felt that this is easily overdone, since, among other reasons, hedges under shade trees are difficult to keep evenly trimmed and in good condition. We set out a great deal of hedging, but usually we did it because it was the cheapest acceptable way to make a necessary means of separation on a property line.

Since much the larger part of the expense of planting is in getting a proper depth of soil properly prepared, we chose for a given expense to have a few plants well fed rather than a large number half starved. Moreover, we thought it advisable for the corporation to do only the minimum amount of planting necessary for good appearance, and to do this so that it would be as easy as possible of upkeep for those who were not much interested in planting, leaving to those of the occupants who were more interested the chance to plant and tend as much more as their places would allow.

In order to make the whole development more complete and attractive, the corporation planted the small public squares and similar places which were practically parts of the street system, just as it did the planting strip along the streets. Any larger parks, however, we usually developed only so far as was necessary to keep them in good condition. We cleared undergrowth that was too great a fire risk, endeavoring, however, to preserve good natural shrubberies which were so placed that they could form part of the permanent scheme. In some cases we cut out undesirable trees, using the lumber on the job. Beyond this we did not go, on the general principle that any work which could be postponed without great ultimate loss should be so postponed.

FENCING.

The matter of proper fencing between lots and along streets and alleys proved to be more of a problem than might at first appear. Where some of the people at least have gardens, where there are many children, where clothes are hung out to dry, some effective barrier along the lot lines is usually an essential to amicable living, and the total cost of all this fencing is no small item in a development. Board fences we did not allow because they offered too much temptation for accumulation of rubbish. Good wooden picket fences were too expensive. Light wooden posts and stringers with "chicken-wire" netting were cheap, but so short-lived as to be, in our opinion, a bad investment. As a general policy we omitted all fencing where local custom or the particular use of the area made this practicable.

We planted hedges instead of fences when this could reasonably be done. This was not advisable when the lots were very narrow, as the hedges take up too much room. We thought that it was not advisable to hedge all the front yards along all the streets in any large community, because it gave an unpleasant monotonous and institutional effect to the development. Sometimes we used hedges in front of the houses on corner lots, or in other chosen places, so as to strengthen the corner and prevent cross-cutting, but we omitted any hedge or fence along the middle of the block, letting the informal shrubbery, carefully placed, mark the property line and decorate the front yards. In many developments we omitted all fences and hedges in front of the houses. Where fences were essential we preferred on the whole an open iron fence, with posts, rails, and pickets, or a chain-link wire fence with steel posts and a top rail, which was inconspicuous, reasonably permanent, neat and decent in appearance, and, considering the general war prices, fairly cheap.

PREPARATION AND COORDINATION OF PLANS.

In all the designing of the surface of the ground, and the locating of houses and utilities, in which at least three different professional men usually had a hand, all working under great pressure, there was great risk of failing in coordination. The designers might each work out the same thing, or omit something altogether because each designer thought another designer was attending to it, or they might make designs for different constructions which,

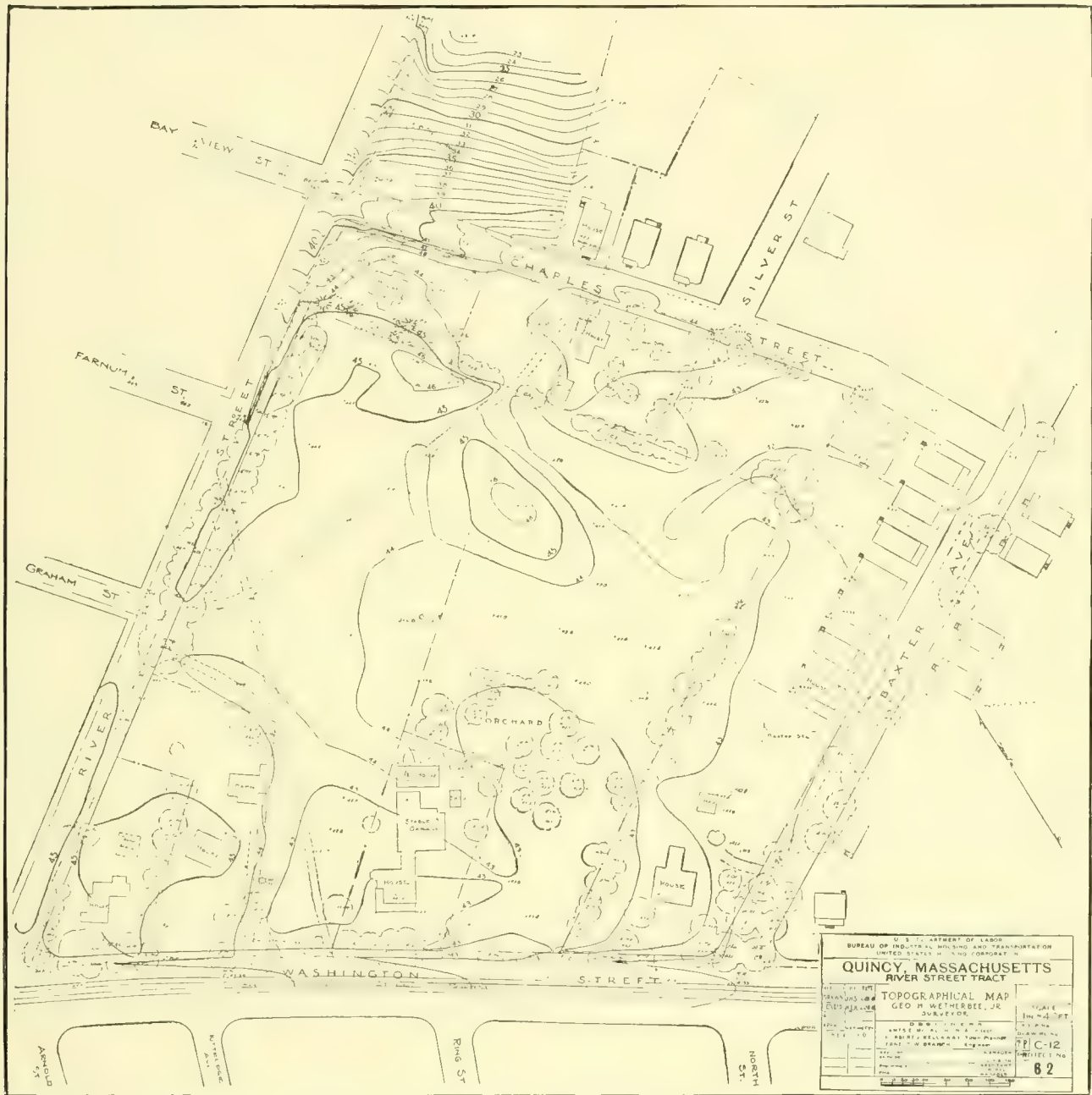
while each might be good in itself, did not fit together into one consistent scheme.

The general function of the Town Planning Division in this regard, and the special responsibility of the chairman of the Committee of Designers, we have already explained (see p. 28 and p. 21). To further reduce this danger of overlap and discrepancy and omission we adopted a general system of preparation of plans which was intended to show all the necessary information for the contractors which should appear on plans, without confusing one set of information useful to one branch of the construction force by adding to it another set of information valuable only to another branch.

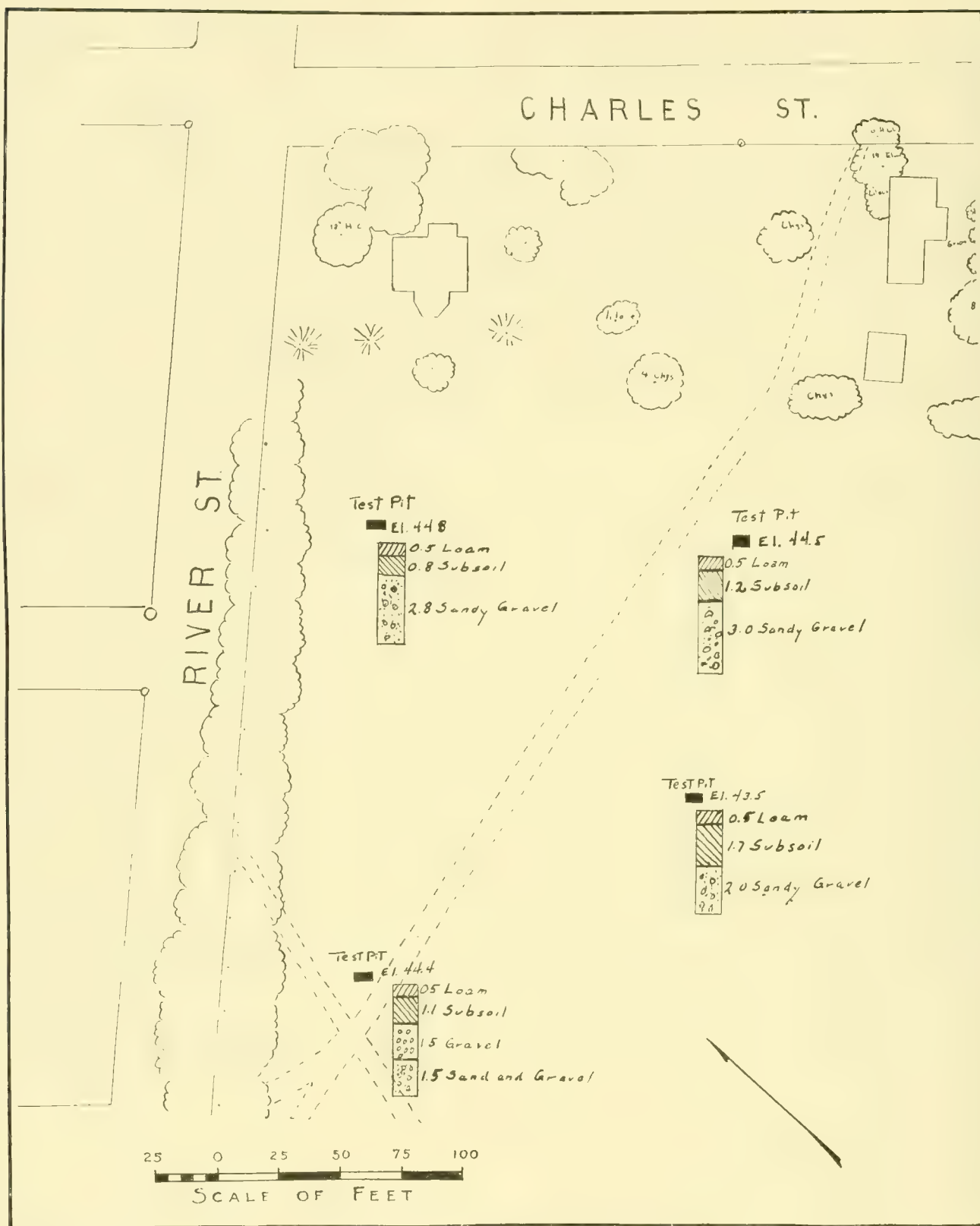
In the first place, the topographic maps, upon which all the utilities plans and grading plans were based, were plotted in relation to cross-section stakes accurately set in the ground and accurately related to each other and to a number of fixed points, especially to the existing streets, houses, and boundaries of the property. Since all the governing measurements of the proposed plans were related to these fixed points, all the plans necessarily bore the same relation to the actual ground.

Of course, the surest way, theoretically, to check discrepancies among the engineering, town planning, and architectural fields of design for a given project would be to put all the plan information on one drawing. This was usually impossible, at any reasonable size and scale of plan, and in any case would usually be undesirable because of confusion among the different construction branches. This essential check was commonly made by putting the various tracing-cloth plans from the engineer and the town planner down one over the other and so making sure, both that things shown on two plans were the same on both and that the relations of things shown only on one plan to things shown only on another were also correct.

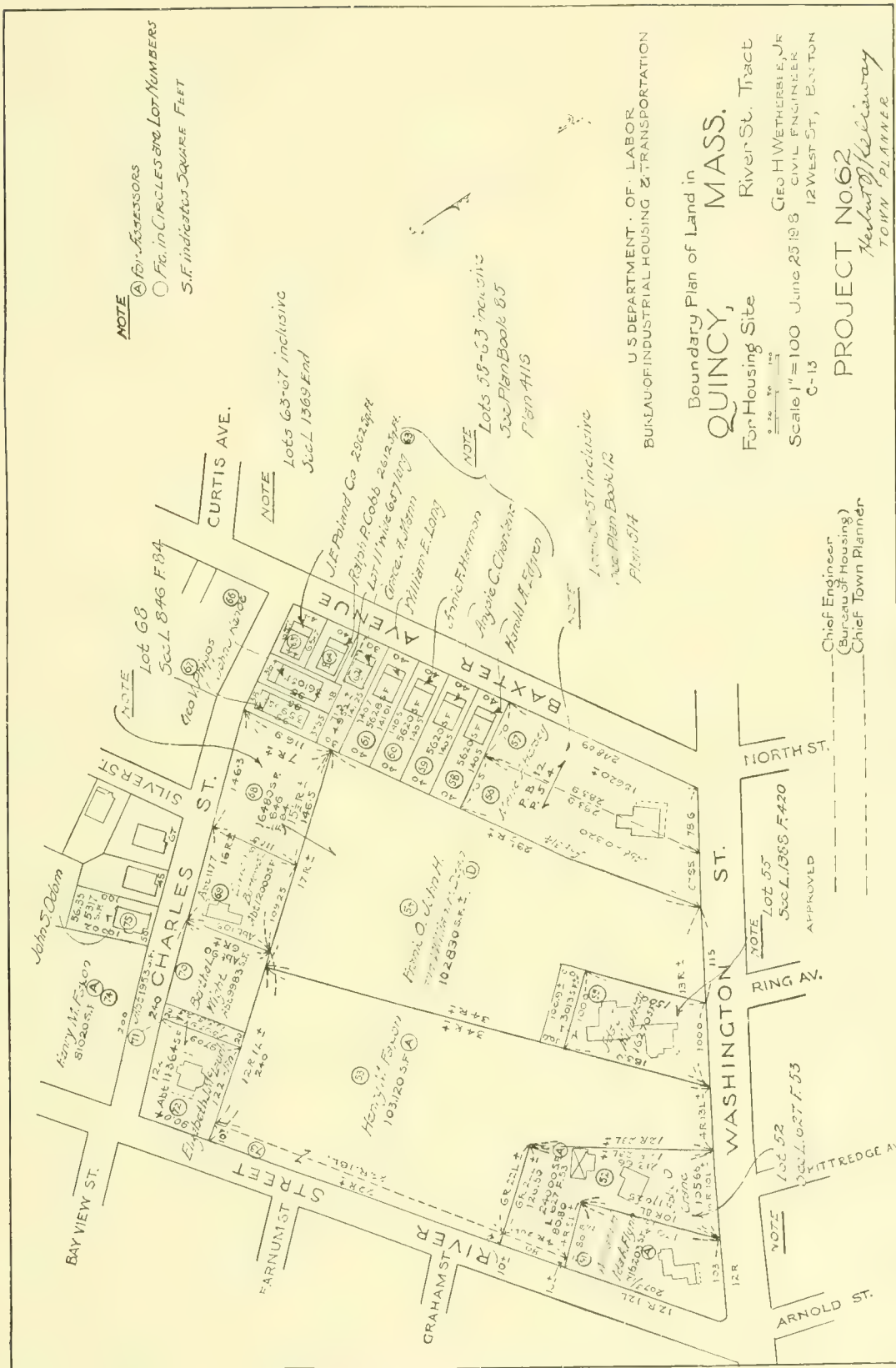
The grading plan and the main utilities plans showing sewers, water, and pole-lines were all at the same scale. On such grading plans as were worked out in full detail were shown the surface grading, with 1-foot contours and curb and gutter elevations, especially at street corners; the roads, sidewalks, planting strips, street trees; electric-light poles and telephone poles; hydrants, catch basins and drain inlets; houses and other buildings with first-floor elevations, and usually designations referring to the architect's plans and telling just



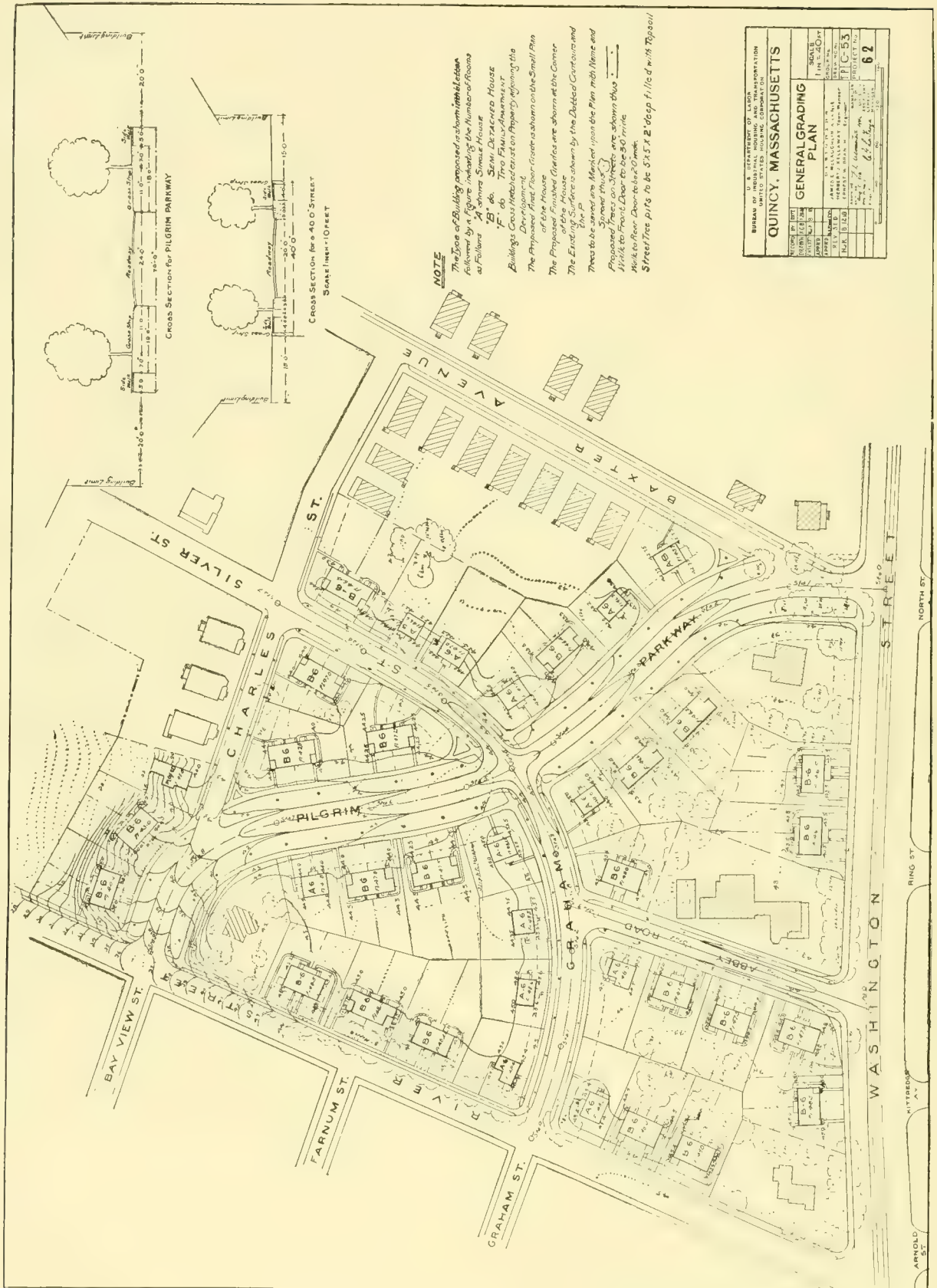
TOPOGRAPHIC MAP.



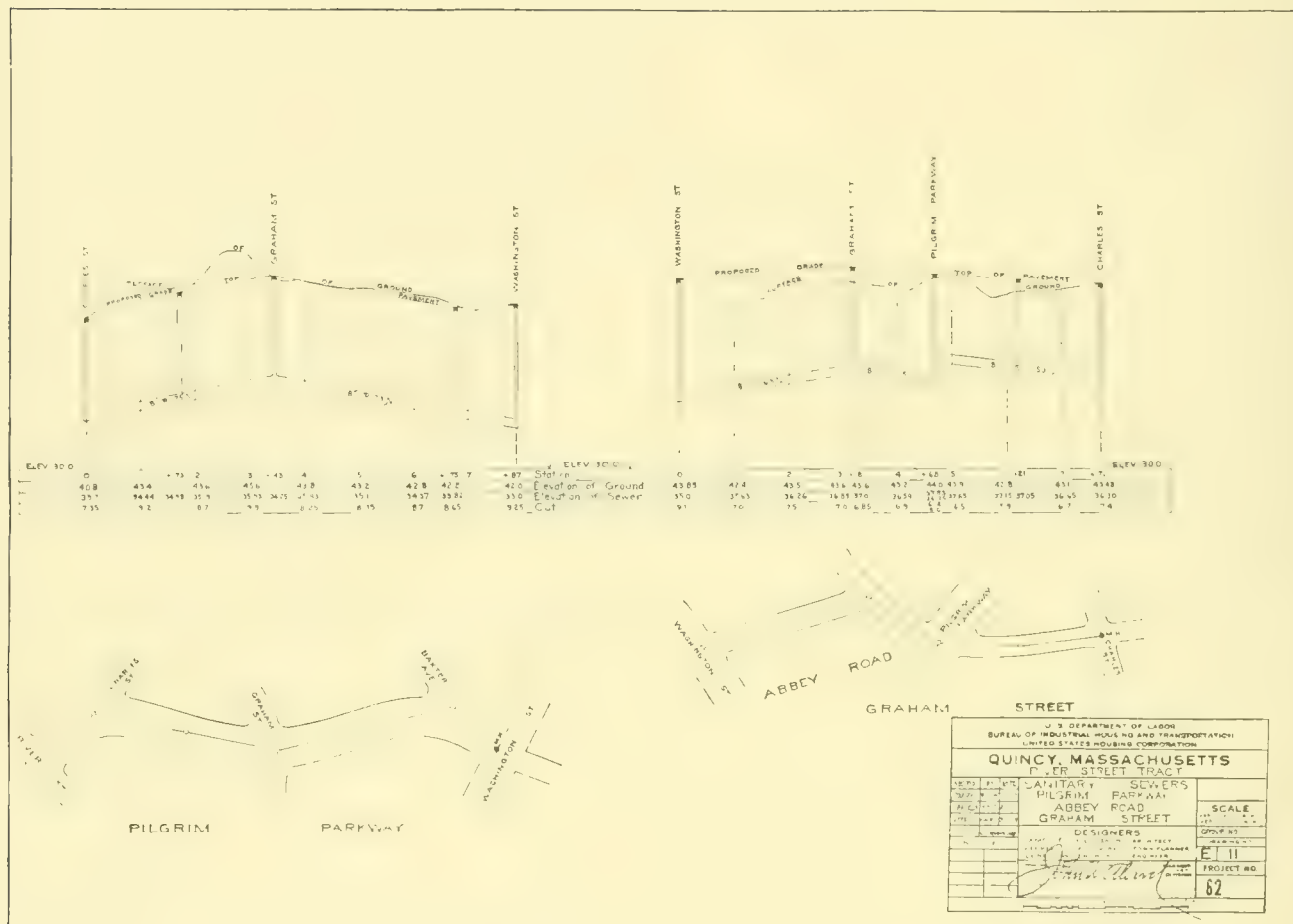
QUINCY, MASS., RIVER STREET TRACT.
Plans showing location and character of test pits.

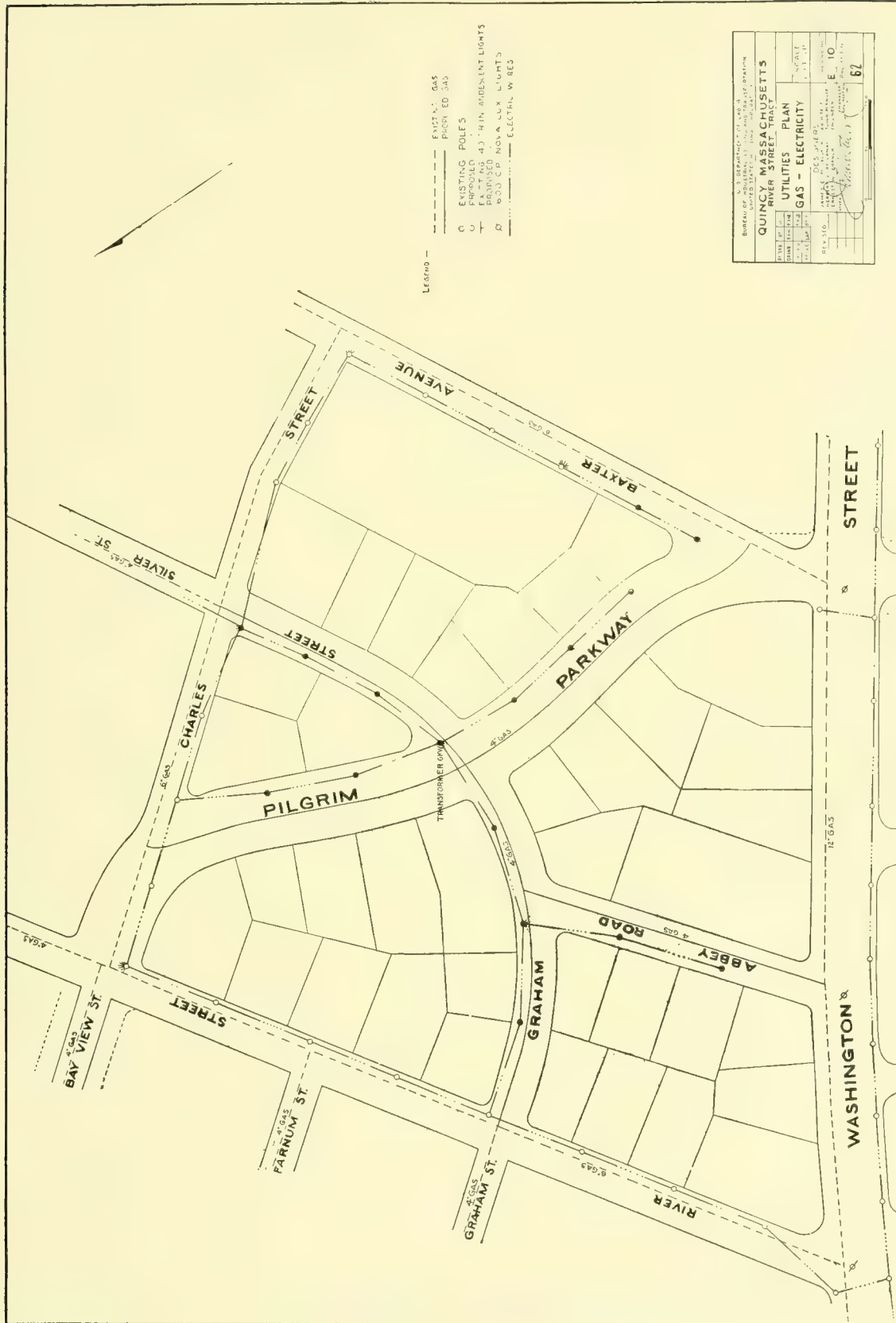


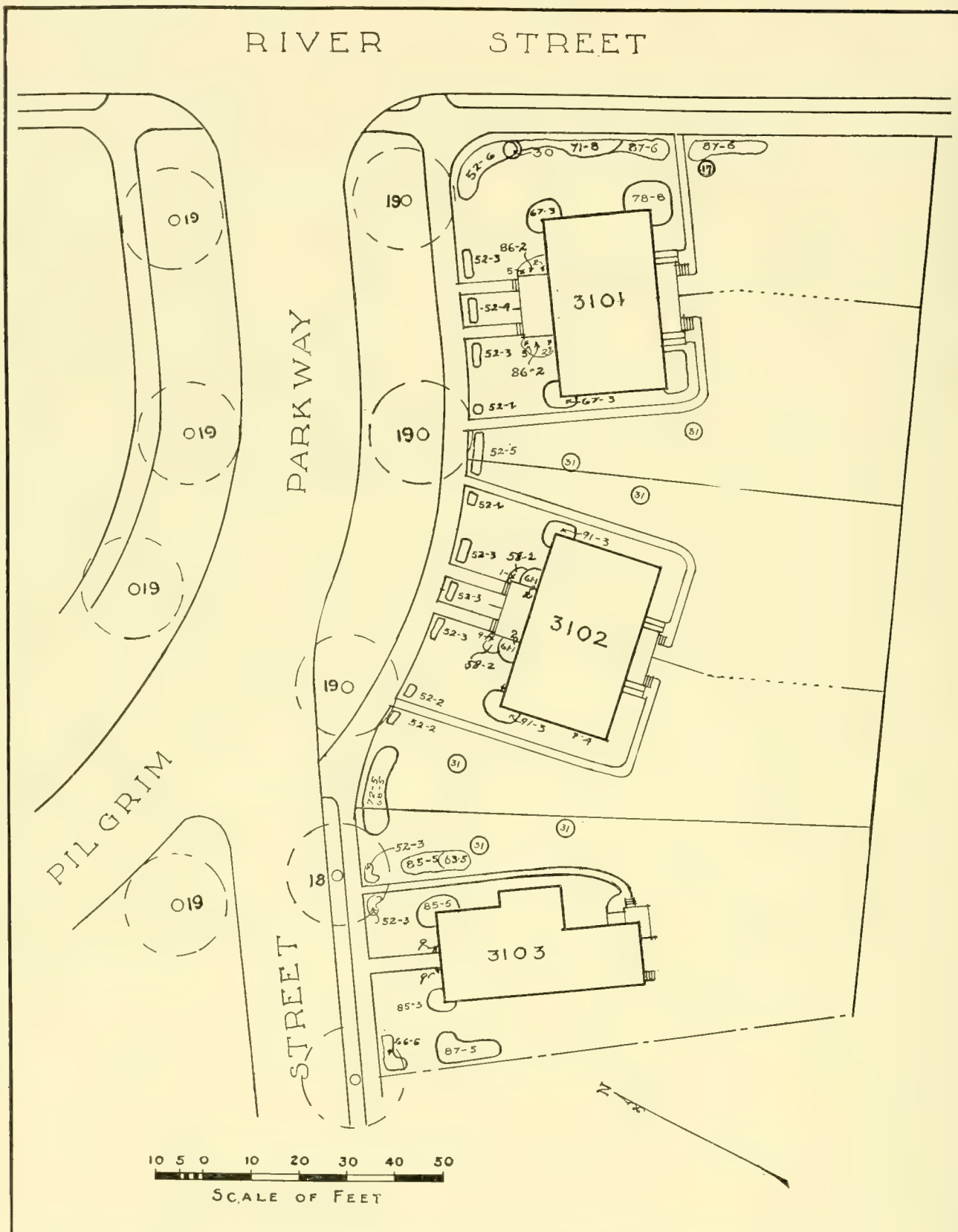
BOUNDARY PLAN.



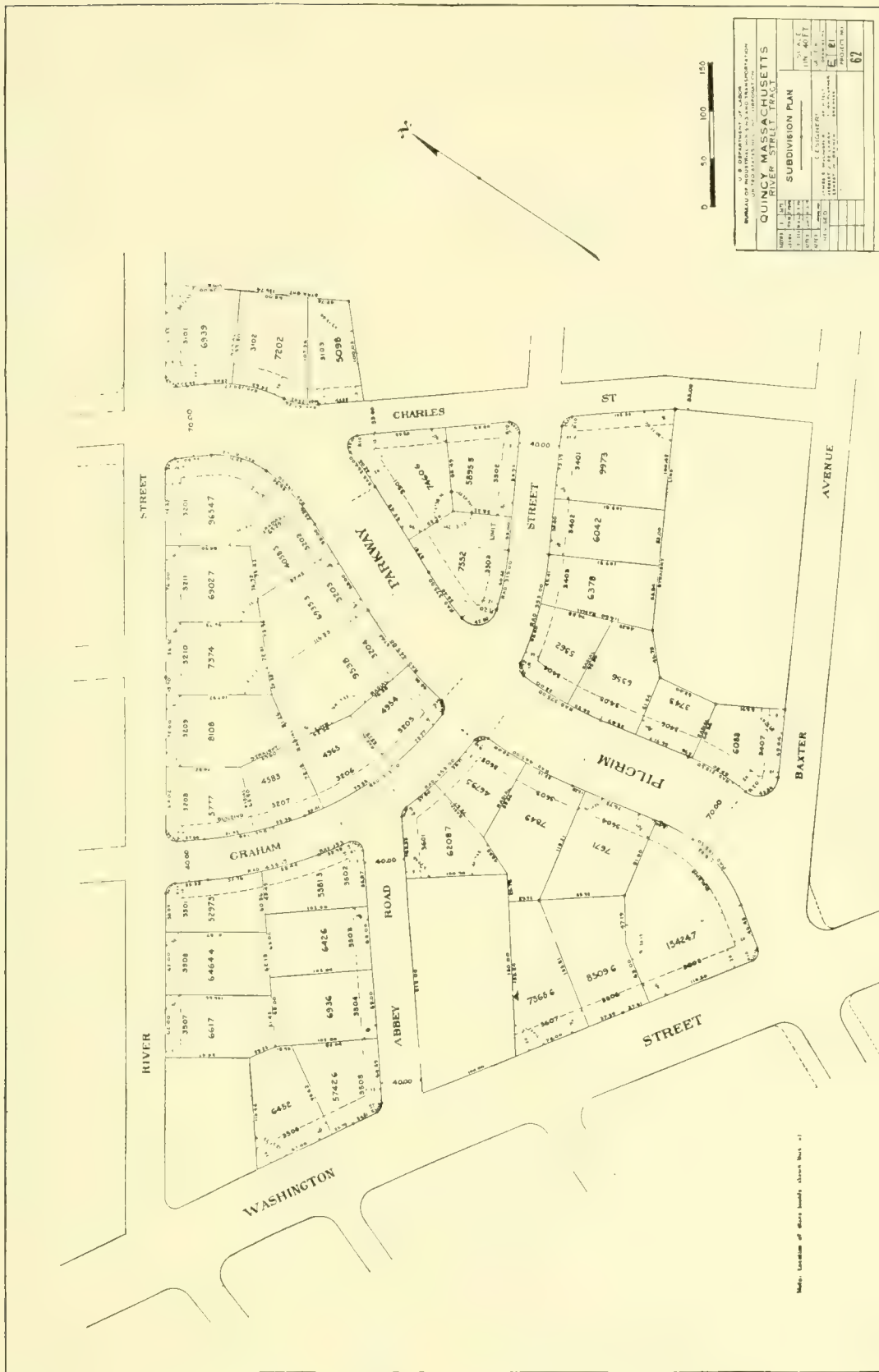








QUINCY, MASS., RIVER STREET TRACT.
Planting plan, three typical lots.



what house was to be built in each location; paths and entrance roads, and in general anything of importance that is visible on the surface of the ground.¹

The center lines of the roads were shown on the grading plan, and properly related by designated "stations" to profiles and typical cross-sections showing this surface in its relation to some selected horizontal datum plane. These profiles of the road surface formed a part also of the engineer's profiles which accompanied his plans for the water supply and sewerage.

Grading plans were made on all projects. The degree of detail, however, varied with the character of the topography. On some rough and steeply sloping sites a complete grading plan, as just explained, was necessary. On other flat or gently rolling sites the profiles of the roads and the elevations of the first floors of the buildings, with a general statement of the relation desired between the first-floor level of the house and the ground around it, of course carefully studied in relation to an accurate topographic map, were enough to record. Much effort was made to save labor and simplify plans, showing nothing unnecessary, and not specifying construction more minutely than we hoped to be able to superintend it. We knew, however, that we should save time by carrying the plans into detail enough while we had all sides of the subject in mind and before construction began, so that we were reasonably sure that we should not later have to change or spoil our scheme on account of some unforeseen difficulty.

The water supply and sewerage designs and gas supply design, if any, were when practicable shown together on one plan, to save time and errors. The above-ground features of these designs were shown also on the grading plan, as has been said.

The electric services, poles and wires, were all shown on one separate plan, the poles appearing also on the grading plan. Careful cross checking was necessary between the pole-line plans and the plans of house locations and lot lines, especially when the pole lines ran within the blocks and not entirely along the streets. Separate detailed plans of special features of the utilities were made when necessary, usually at a large scale.

The house plans and elevations, when complete, took into account the grading about the house in its

relation to the floor level, as shown on the grading plan in cooperation with the architect. As far as the house itself was concerned, we allowed for differences in grading about any given house plan, when the plan was repeated on several sites, by notes on the architectural drawings in some cases, and in others by drawing sketch elevations of the basements of the houses only and showing on these sketches the line of the finished grading against the foundation.

The planting plans for the various developments were usually different from those which would be made by a landscape architect for small private work. This was because of the comparative simplicity and cheapness of the planting required, and because it was possible to save much time and labor, both in the office and in the field, by making a certain number of typical planting plans for the lots, and using these, with proper variations to suit the circumstances, throughout the development.

Usually there was one general planting plan, at the scale of the grading plan, showing the street trees, such little planting of parks and public open spaces as there was, and perhaps hedges along streets if certain streets only were consistently so treated. This plan served also as a guide for the lot planting, referring, by number and letter for each lot (as, for instance, A6-1 on pages 44 and 45), to a set of larger-scale lot plans each one of which was used many times, with minor variations only, for lots of a similar kind. For particular corner lots or other unusual cases special planting plans still had to be made, but these cases were few.

Each typical large-scale planting plan was usually based on a particular type of house, and was used where that house occurred. To produce more variation, however, which was usually desirable, several further methods were practiced. For example, in some cases each typical planting plan had its plant locations numbered, referring to a planting list as usual; but a number of different lists of plant groups were used, as designated by letters on the general planting plan, or on a tabulated memorandum, so, according to the planting list designated, a repeated house plan might have any one of eight or more different sets of shrubs or trees grouped about it. (See p. 43.)

Those various precautions, together with the further variations which will be made by the planting superintendent for the sake of further interest or to meet local conditions, will, we believe, give as

¹ See p. 36, Quincy grading plan, but compare also p. 139, Butler grading plan.

much diversity between one lot planting and the next as is desirable, without multiplying plans or confusing the man in the field or tying his hands by a multitude of directions.

The specifications and estimates of cost accompanying the various plans were checked over in the same way as the plans. There was always the danger, for instance, that on account of a variation from the typical procedure for some local reason the subcontractor excavating the cellar might make an estimate on disposing the material, and the general grading contractor might also have this same material included in his estimate for filling, thus counting it twice.

"Show plans" were not authorized to be made by the designers. Their time and effort were concentrated on speeding those plans necessary to the actual construction of the job. After the armistice the general plans and diagrams used to illustrate this report were drawn up in the office of the corporation, this being the cheapest and quickest way to produce them in a comparable and consistent form.

MUSKEGON, MICH. (M'GRAFT, SMITH, AND SCHOENBERG TRACTS),
HOUSING PROJECT NO. 997.

The following is a list of the different groups of plantings to be used on the lots.

Group (a).	Group (b).
1. <i>Symphoricarpus racemosus</i> .	1. <i>Philadelphus avalanche</i> .
2. <i>Diervilla floribunda</i> .	2. <i>Diervilla floribunda</i> .
3. <i>Syringa vulgaris</i> .	3. <i>Viburnum opulus</i> .
4. <i>Clematis paniculata</i> ; <i>Lonicera halleana</i> .	4. <i>Clematis paniculata</i> ; <i>Vitis coignetiae</i> .
Group (c).	Group (d).
1. <i>Rosa rugosa rubra</i> .	1. <i>Berberis Thunbergii</i> .
2. <i>Hydrangea paniculata</i> grfl.	2. <i>Spirea Van Houttei</i> .
3. <i>Philadelphus coronarius</i> .	3. <i>Hibiscus syriacus</i> (white, pink).
4. <i>Ampelopsis quinquefolia</i> ; <i>Akebia quinata</i> .	4. <i>Actinidia arguta</i> ; <i>Pueraria thunbergiana</i> .

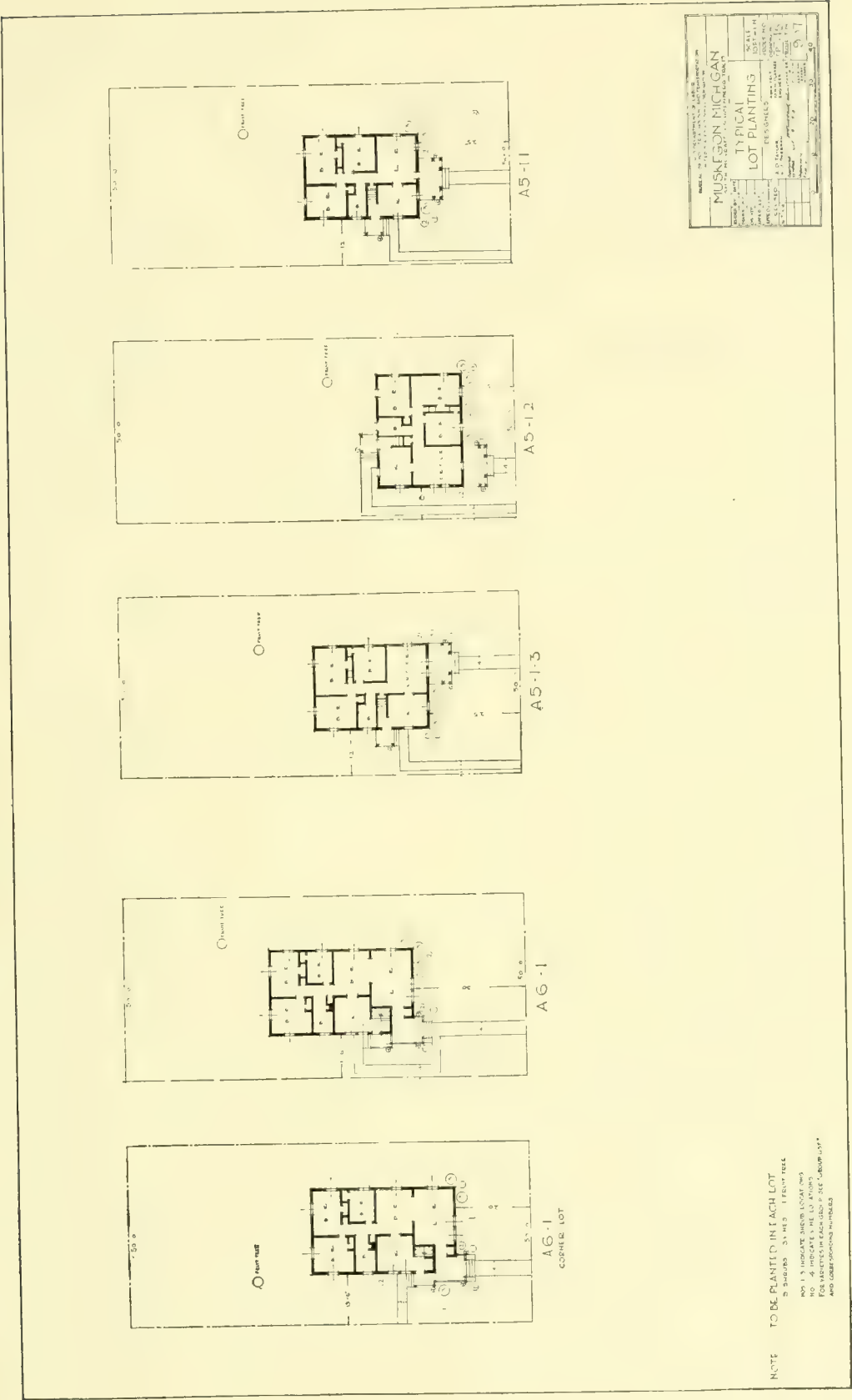
Group (e).	Group (f).
1. <i>Rosa rugosa alba</i> .	1. <i>Syringa persica</i> .
2. <i>Forsythia intermedia</i> .	2. <i>Hydrangea paniculata</i> grfl.
3. <i>Viburnum dentatum</i> .	3. <i>Cornus paniculata</i> .
4. <i>Vitis coignetiae</i> ; <i>Akebia quinata</i> .	4. <i>Actinidia arguta</i> ; <i>Lonicera halleana</i> .
Group (g).	Group (h).
1. <i>Berberis Thunbergii</i> .	1. <i>Symphoricarpus racemosus</i> .
2. <i>Forsythia intermedia</i> .	2. <i>Spirea Van Houttei</i> .
3. <i>Syringa vulgaris</i> .	3. <i>Lonicera tatarica</i> grfl.
4. <i>Ampelopsis quinquefolia</i> ; <i>Pueraria thunbergiana</i> .	4. <i>Lonicera halleana</i> ; <i>Actinidia arguta</i> .

The following is a tabulated memorandum showing distribution of groups of plants on various lots:

Group (a).	Lot.	Group (b).	Lot.
Block V.....	1, 9	Block V.....	2, 10
Block VII.....	5	Block VII.....	4
Block VIII.....	3	Block VIII.....	4
Group (c).		Group (d).	
Block V.....	3	Block V.....	4
Block VII.....	3	Block VI.....	4
Block VIII.....	5	Block VII.....	2
		Block VIII.....	6
Group (e).		Group (f).	
Block V.....	5	Block V.....	6
Block VI.....	2	Block VI.....	3
Block VIII.....	7	Block VIII.....	8
Group (g).		Group (h).	
Block V.....	7	Block V.....	8
Block VI.....	5	Block VI.....	1
Block VIII.....	1, 9	Block VIII.....	2, 10

Total number of times each group is used.—Group (a) 4; group (b) 4; group (c) 3; group (d) 4; group (e) 3; group (f) 3; group (g) 4; group (h) 4.





MUSKOGEE MICHIGAN	
TYPICAL LOT PLANTING	
SCALE	1" = 20'
DATE	10/1/11
BY	J. L. HARRIS
CHECKED	J. L. HARRIS
APPROVED	J. L. HARRIS
PROJECT	LOT PLANTING
NO.	1
SHEET	1
TOTAL SHEETS	1
DATE	10/1/11
BY	J. L. HARRIS
CHECKED	J. L. HARRIS
APPROVED	J. L. HARRIS

CHAPTER V.

DWELLINGS AND OTHER BUILDINGS.

Early studies—Names of house types—"Standard plans:" bungalows, detached houses, semidetached houses, two-flat houses, semidetached two-flat houses, dormitories, convertible houses, apartments, cafeterias, schools, stores, recreation buildings, hospitals—"Standard details"—Later architectural developments of the Housing Corporation's work—Ideals and results—Comparison of Corporation requirements with current methods—Influence of locality—Materials substituted for economy, conservation of war material and rapidity of construction—Plan disposition—General observations.

EARLY STUDIES.

In creating an organization to design and construct houses for workmen as a Government function, one of the many questions to be settled was the method of procedure in design. Two main lines of policy were open—the corporation might act as architect for all work, or might employ architects in private practice. The latter course was adopted. But before the time when such employment should begin and while legislative authority to build was awaited, a great amount of preparatory work was undertaken.

The difficulty of this work, and the need for it, in face of the large program in view, was increased by the lack of experience in this country in regard to housing on a large scale. Modern workmen's villages of England and the Continent, while usually excellent in design as to appearance were not suited to our living conditions and methods of construction. Little information was available concerning the few private developments and the work of speculative builders, which ranged in quality from good houses offered on fair terms down to anything that could command a market. So that the architects from all parts of the country who very generously complied with requests for drawings of houses which they had built, approximately suitable for the proposed housing developments, furnished the real basis upon which this preliminary architectural work was done.

A conference called by Mr. Eidlitz of a number of prominent architects, town planners, sociologists and men interested in industrial problems resulted in a report issued in March, 1918, as a bulletin by the Department of Labor under the title "Standards recommended for permanent industrial housing developments,"¹ which later became a sort of accepted

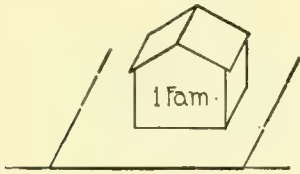
description of normal types and standards for all developments. On the basis of the standard requirements established in this report all the plans collected were compared, and the most promising types selected for study and revision. The resulting plans were called for lack of a better name "standard plans." They were intended to serve as condensed practical guides to architects employed, rather than as hard and fast forms. The architect, while held to a proper limitation, and given a tentative solution, was free to exercise his own ingenuity in the improvement of the plan, in the design of the exterior, and in its execution. He was told in a letter of instruction issued that "we must depend upon simplicity of design, the avoidance of unnecessary variety in types, and plain common sense in the choice of materials, to get our cost down to rock bottom. Our problem is to build houses which workmen will like to live in and which they can afford to rent and buy * * *."

As the standards developed, many types were discarded which were too large in area or cubage or which did not give a relatively large ratio of room area to total area. Thus a great deal of experience was gained beforehand which otherwise would have been gained only with much greater expense and delay during the actual progress of the work. Originally conceived to represent minimum requirements, the imperative need of securing as many houses as possible with a limited sum of money often turned the standards into maximum requirements, and although a write-off of abnormal "war costs" was contemplated, any excessive expense incurred entailed the danger that workmen might still be unable to afford the houses. Almost before the standard plans were finished increasing cost of building had rendered many of the larger types impracticable for our purposes. Some types also, though correct as to size

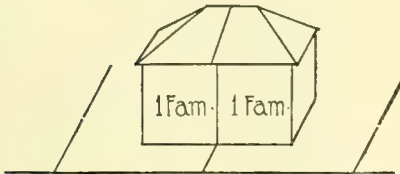
¹ Reprinted in this volume, p. 505.

EXPLANATION OF NAMES OF HOUSE TYPES.

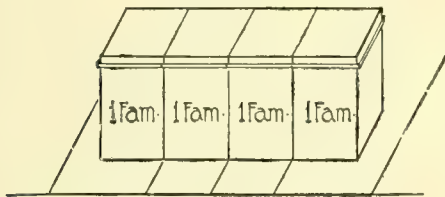
To insure uniformity in nomenclature of house types in the report the following names have been adopted (matter in parenthesis is explanatory only and not intended as precise definition):



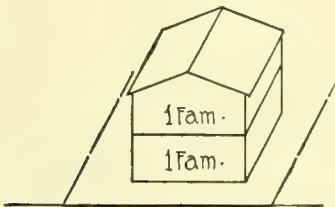
Detached house.—(The “single house,” one family in a building.)



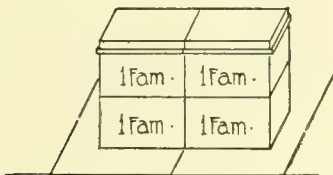
Semidetached house.—(A one-family house having one party wall only in common with an adjacent house. Each half of the building is a “Semidetached house,” the whole building is a pair of semidetached houses.)



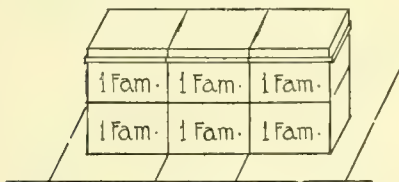
Row house.—(A one-family house attached with two or more others to form a continuous row or group in which the several houses are separated from adjacent houses by party walls.) This type may be divided according to location in the group or row into: *Row end houses* and *row inside houses*.



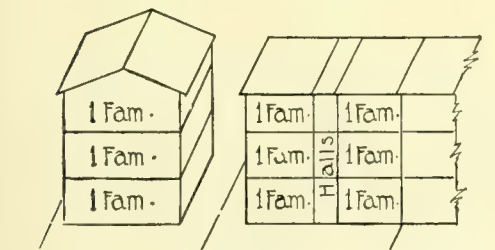
Detached two-flat house.—(The “duplex house,” two families in a building, one over the other.)



Semidetached two-flat house.—(A two-flat house having one party wall only in common with an adjacent house; normally one-half of a building containing four families, one in each story in each half.)



Row two-flat house.—(A two-flat house attached with two or more others to form a continuous row or group, in which the several houses are separated from adjacent houses by party walls.) This type may be divided according to location in the group or row into: *Row end two-flat houses*, and *row inside two-flat houses*.



Apartment house.—(The “tenement house,” containing three or more families, normally one or more families on each of three or more stories, served by a common hall or stairs.)

of units, were discarded because certain other quite uniform arrangements of plan worked better. It developed also that bathrooms and kitchens, especially in their relation to each other in the matter of plumbing, could advantageously be arranged according to plans so constant as to become practically standard. All the standard plans are published, however, with the thought that they will prove interesting in comparison with the plans which were finally developed from them by the architects to meet special local conditions.

STANDARD PLANS.

The following notes descriptive of standard plans, and covering a few buildings for which there were no standard plans, are intended to state briefly the less apparent points of advantage and some of the faults which developed in their use.

BUNGALOWS.

Types A, D, and H—called semipermanent—were designed to have a high salvage value or to be readily converted into permanent houses in case of continued demand after the war, by the substitution of permanent foundations and brick chimneys, and by plastering the interior walls.

Types B, C, E, F, and G were designed as permanent houses.

DETACHED HOUSES.

Type I is a convenient and compact plan, but the two-story detached house is not as economical a form of combining four rooms as the semidetached or the row house or apartment. It was used, eventually, however, where required for special conditions.

Type J can be made into a full two-story house at slightly greater cost, increasing the size of the bedrooms, but at the expense of its cottage character.

Types K and L have not the economical rectangular plan, but they were designed for use in giving variety to a street which might otherwise be very monotonous.

Type M, a variation of this type built at Waterbury, Conn, Type A₁, has proved one of the best six-room houses, very economical and adaptable to variation in elevation and to grouping as semidetached houses.

Type N is shown by the percentage chart ¹ to be a cheaper type and one adaptable to use as a semi-

detached house. A fireplace could be placed in the living room using the single chimney.

Type O has a higher wall percentage;¹ but its size and its simple framing reduce labor cost.

Type P, the plan of the second floor with four bedrooms, while very economical in other respects, gives rather too generous first-floor rooms.

SEMI-DETACHED HOUSES.

Types R and RR were designed for the somewhat unusual though recurring case of a wide and very shallow lot. The same space could have been more economically inclosed had the plan been more nearly square.

Types Q and QR, six-room semi-detached, can also have the bathroom directly over the kitchen plumbing.

Types S and SR are a variation of Type M.

Types T₁ and T₂ show an attempt to better a type which had been erected in certain sections of the country to permit very low rentals. The rooms are so small, however, that it was not finally built by the Housing Corporation, but the addition of 3 feet in depth makes it a satisfactory plan, and it was used in this improved form.

In types U and UR, a six-room row house, the front hall partition can be eliminated and the additional space thrown into the living room.

Type V is the end house of a row or group.

TWO-FLAT HOUSES.

Type W is so arranged that the front and rear entrances for each family are entirely separated and the lot can be divided front and rear. An adaption of this plan is used in Bridgeport, Conn. The elevations for Type W show an interesting departure from the usual two-family house.

SEMI-DETACHED TWO-FLAT HOUSES.

Types X and XR proved too expensive for general use in spite of their good plan. A variation of this plan is shown in Florence, Ala., page 92.

DORMITORIES.

Originally dormitories were planned for men and for women with bedrooms about 11 feet by 7 feet 6 inches and 8 feet high, for a single occupant. In the dormitories for women a living room,

¹ See chart on p. 399.

laundry, and special toilet arrangements, and a room and bath for the matron were required.

None of these were provided in the dormitories for men, the caretaker using the general baths. Bedroom closets increased the size and cost of the building, so open shelves having hook strips below were used with provision for curtains of washable material. No dormitory over two stories high was contemplated, but later an exception was made in the case of the Washington, D. C., dormitories with the use of noninflammable outside walls, because of inadequate available land. Transverse fire partitions with self-closing fire doors divided long buildings, and fire escapes were provided at the ends of corridors.

It soon became apparent that in most communities dwellings were especially needed for men with families or dependents, as quickly as an adequate number of suitable dwellings could be constructed. The single men could largely be cared for as boarders, and the single women were thus generally the only class to be continuously housed in dormitories. It seemed probable that dormitories originally used for a sudden influx of men workers would revert eventually to women. Therefore, it was decided that all dormitories should be built so that they might be made available for women.

The standard dormitory as illustrated accommodates 57 or 59 men, S 27 accommodates 93 men and has a small lounging room and an office, but no living room. The outside porch is glazed and screened to serve as a living room in winter and summer.

CONVERTIBLE HOUSES.

The so-called convertible type house is of permanent construction, designed to be used for a period as a boarding house or dormitory and to be altered by slight changes in partitions and the addition of bathroom and kitchen fixtures for use as semidetached or row dwellings. This type is illustrated by houses at Alton, Ilion, Aberdeen, and Indianapolis.

APARTMENTS.

A limited number of apartment houses were projected by the corporation as at Staten Island, Bridgeport, Bethlehem, Perth Amboy, Puget Sound Vallejo, Erie, and Washington, D. C. They were housekeeping apartments having three to five rooms each, usually with brick walls and wooden floor construction. A number of these

apartments furnish an interesting basis for comparison on the special requirements due to local custom and climate.

CAFETERIAS.

The cafeteria on the scale required for our developments was practically a new problem. Little accurate information could be obtained until various schemes of kitchen, counter, and seating arrangements had been tried by Government departments. The Quincy Cafeteria (cf. p. 62), while specially designed to meet certain local conditions, shows an arrangement which has been in very successful operation and is typical of our practice. In order to give light and ventilation to large spaces monitors have been generally adopted. Tables with chairs, seating not more than eight, have proved generally preferable to the arrangement of benches shown. The tables should be 2 feet 6 inches wide and spaced not less than 4 feet apart. Passages at the ends of tables should not be less than 3 feet. Hat and coat hooks should be provided, and where the entrance and exit are at the same point it is sometimes advisable to provide a check room. The emergency exits are necessary in case of fire. Dry storage in addition to the kitchen storeroom is generally provided for supplies purchased in large quantities. For convenient checking all kitchen supplies should be delivered at a single entrance, and there should also be a single entrance under control for employees. The bakery is a valuable adjunct in case of inadequate local supply, as it developed that pastry, breadstuffs, and cakes are among the most popular foods supplied.

The cafeteria was found to be so much more efficient and its operation so much cheaper than the restaurant for feeding the occupants of dormitories, that there is only one case, Washington, D. C., in which the restaurant plan is being used. There, owing to the character of the patrons, principally women clerks from Government offices, it was felt that the cafeteria would not prove satisfactory. In the cafeteria at Quincy the selective meal has been displaced by the set meal, permitting a much larger number of workers to be fed satisfactorily with a saving of cost to the individual.

SCHOOLS.

In so many instances the schools had to fulfill the mission of day nursery for older children, because mothers as well as fathers were working, that the

double session recreation corridor type was recommended by the Bureau of Education. The type was not, however, finally adopted as standard and was built only in a few cases, but it is of such interest that it seems worthy of publication, with key plans showing numerous possible compositions. Page 63 illustrating "Special Schools" gives a typical arrangement shown at larger scale together with key plans of smaller buildings. The traditional school-house plan was used with modifications.

STORES.

Stores already existing in the neighborhood of most developments made it difficult to apply any rule for determining the number of stores required for each project. In cases where the projects are isolated, one store for each 40 families was estimated to be sufficient. They are generally grouped at civic centers or placed in rows on opposite sides of a street. They are planned in small units and so constructed that two or more of these units may be combined for a single larger store. Exterior walls are generally of brick, but stucco on wood frame is used in several developments where the houses are of frame. One floor of apartments is generally provided over the stores. These apartments have always independent entrances, so that the apartments may be let separately, although often in demand by the storekeepers.

RECREATION BUILDINGS.

In projects of not less than 500 families or where there are large numbers of men in dormitories without convenient access to other places of recreation the Housing Corporation undertook the construction of recreation buildings of various types and in several cases of isolated projects separate moving-picture theaters were planned with an average of one seat for each family in the community.

HOSPITALS.

The requirements for hospitals did not differ widely from those of the usual clinical hospital, except that the dispensary service was given more emphasis.

STANDARD DETAILS.

Soon after the work on the standard plans was started it was realized that the more common articles of millwork should be standardized, because economy and maximum speed in production would

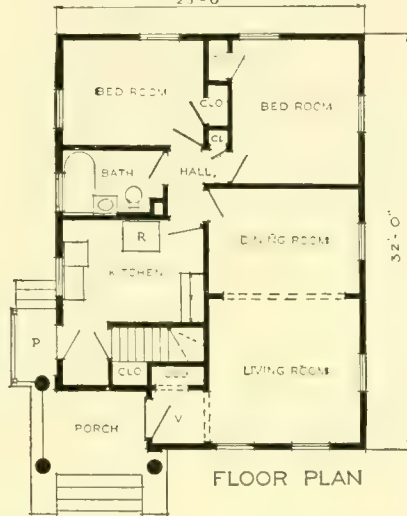
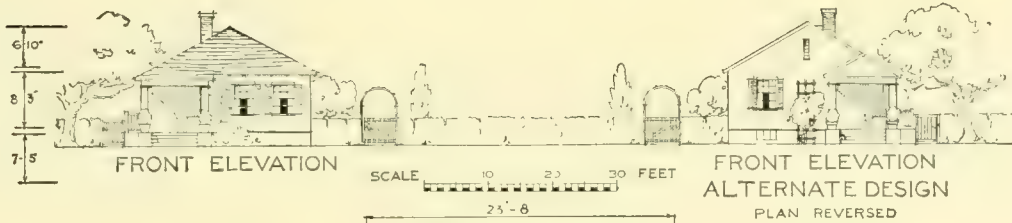
naturally result from the manufacture of large quantities of a limited number of types. The existing standards in the forms used by the so-called "stock mills" did not offer a solution, as there was no uniformity of design in various parts of the country and the number of types was too great. In developing these details economy of labor in installation was studied as well as economy of labor and material in manufacturing, with the result that some of the details seemingly extravagant are justified by reduced cost in installation. An example is the interior wall base where scribing to the wall and fitting the floor against the base are avoided.

The War Industries Board, with its power to stop building for all but Government purposes and its control of all industries for war work, gave the needed opportunity and authority to introduce these details into all the mills of the country. They were adopted by the War Industries Board and approved in conference with representatives of the Army, Navy, and Marine Corps, Treasury Department, Panama Canal Commission, Emergency Fleet Corporation, and the Railway Administration. The War Service Committee on Mill Work was brought into existence to purchase all the millwork used by the Government departments. This gave the greatest flexibility in ordering, as supplies for any project could be drawn from mills in different parts of the country where labor and transportation conditions were favorable, with the assurance that they would "fit," as well as enabling the mills to devote their energies to manufacturing in large quantities.

An example of the savings that would have resulted had the armistice not occurred before the system was in complete operation is afforded by the following seemingly petty economy. On the initial program of 25,000 houses of the Housing Corporation, the saving made by the reduction of 1 inch in the width of the usual stock inside architrave and wall base would have built 50 complete houses, to say nothing of the time and money saved by larger quantity production.

LATER ARCHITECTURAL DEVELOPMENTS OF THE HOUSING CORPORATION'S WORK.

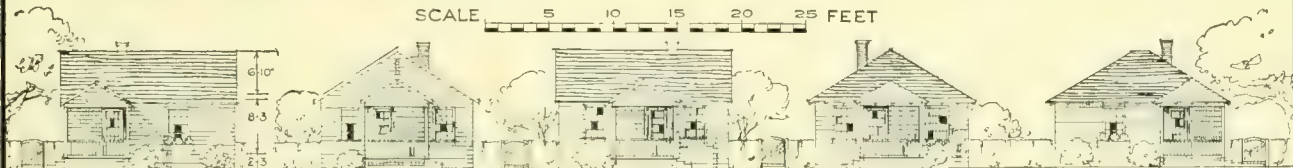
Forced economy and the conservation of war materials left its mark on practically all projects of the Housing Corporation. Many well-designed houses lost their distinction by the unavoidable substitution of materials and by the elimination of all non-essential details, such as blinds and lattices. The



FIVE ROOM BUNGALOW

U S H C STANDARD TYPE E

SCALE 5 10 15 20 25 FEET



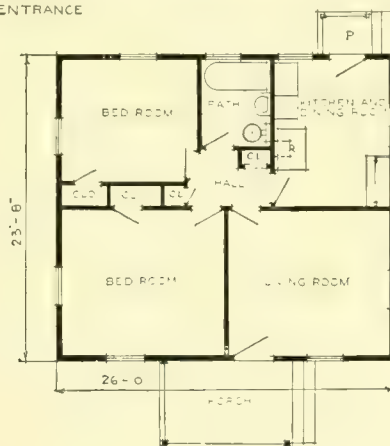
FRONT ELEVATION
WITH REARRANGEMENT OF
PORCH AND ENTRANCE
PLAN REVERSED

SIDE ELEVATION
WITH REARRANGEMENT OF
PORCH AND ENTRANCE

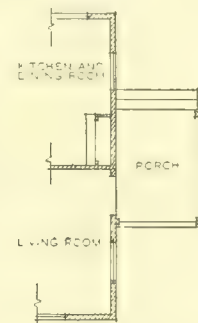
FRONT ELEVATION

ALTERNATE DESIGN
REARRANGEMENT OF
PORCH AND ENTRANCE

ALTERNATE DESIGN
REARRANGEMENT OF
PORCH AND ENTRANCE



FLOOR PLAN



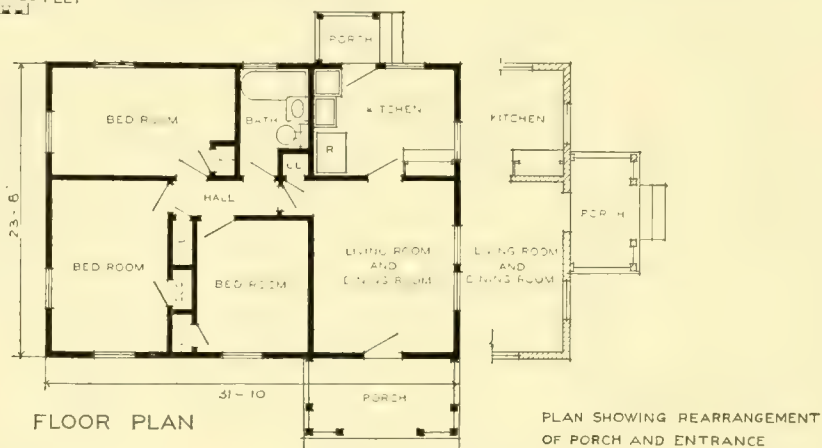
PLAN SHOWING REARRANGEMENT
OF PORCH AND ENTRANCE

FOUR ROOM BUNGALOW

U S H C STANDARD TYPE A

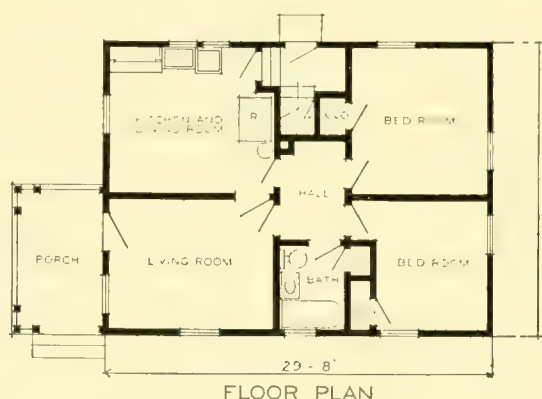
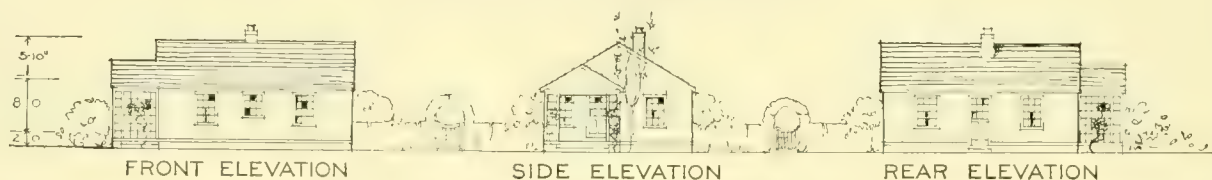
SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION



FIVE ROOM BUNGALOW U.S.H.C. STANDARD TYPE D

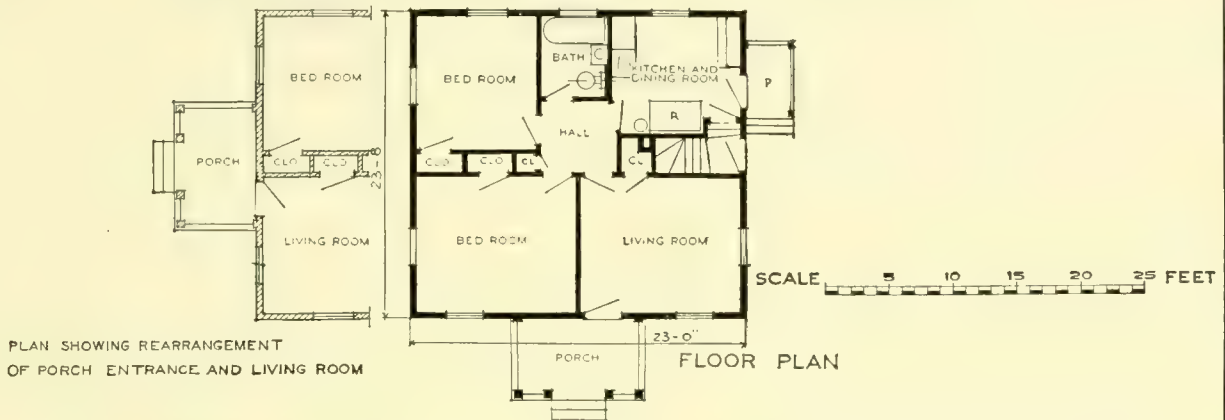
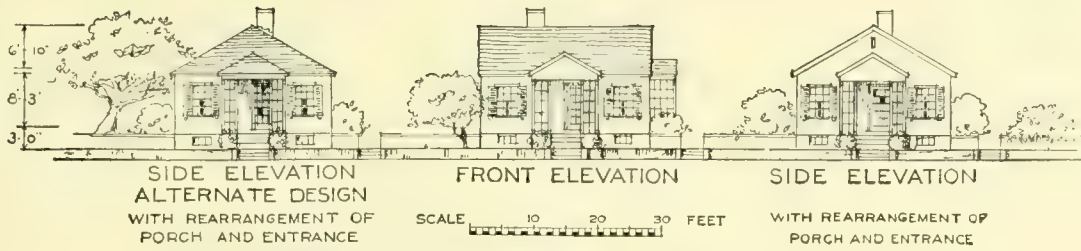
SCALE 0 5 10 15 20 25 FEET



FOUR ROOM BUNGALOW U.S.H.C. STANDARD TYPE C

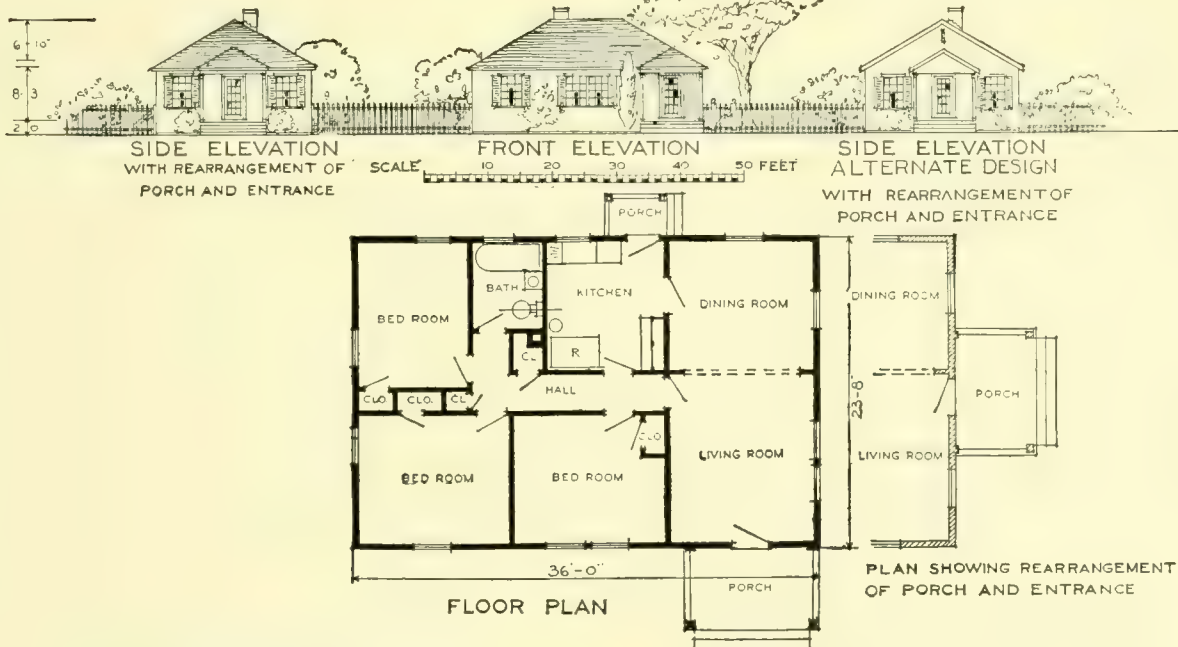
SCALE 0 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION



FOUR ROOM BUNGALOW

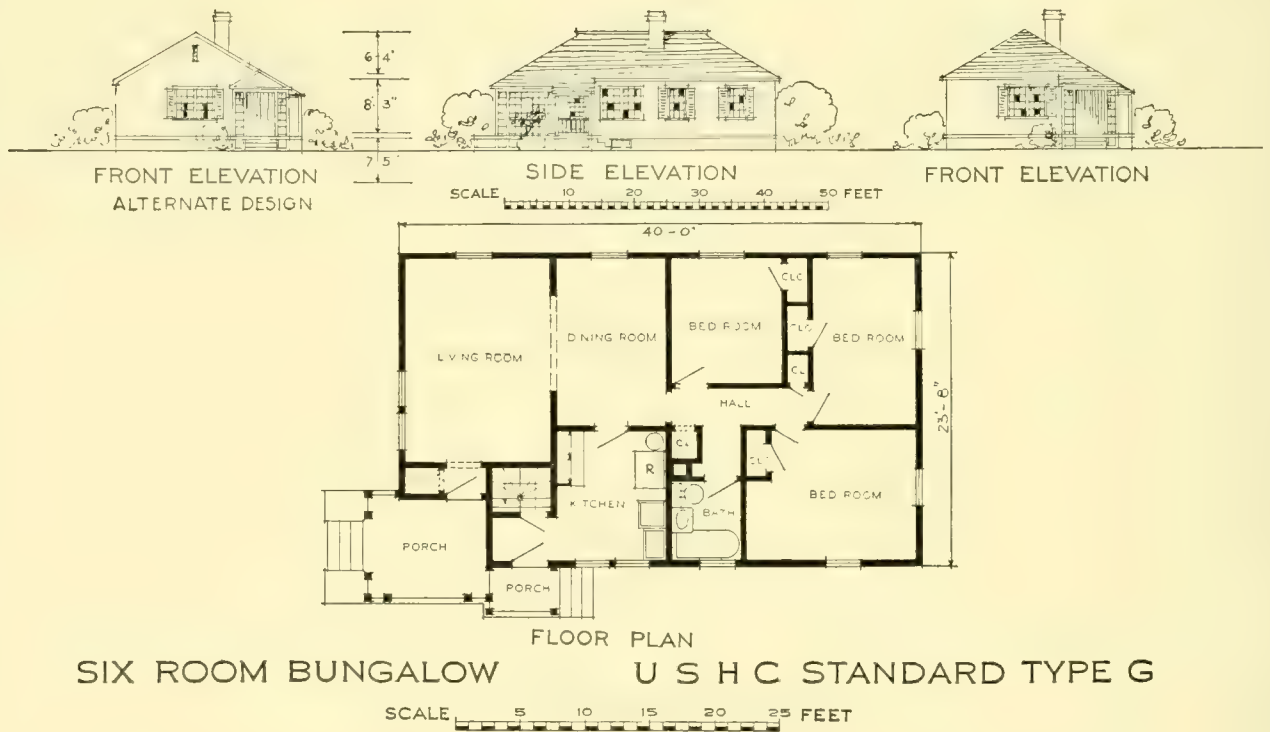
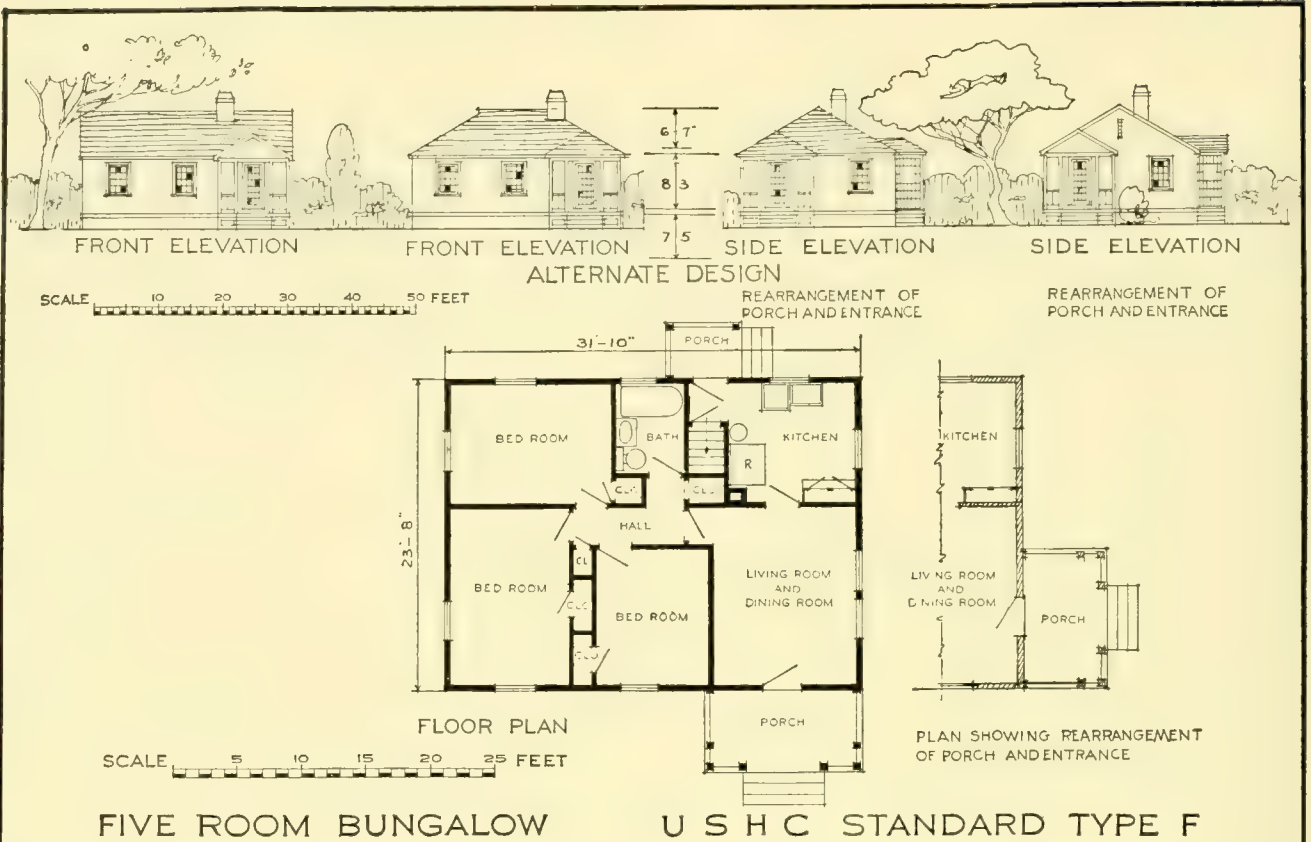
U S H C STANDARD TYPE B



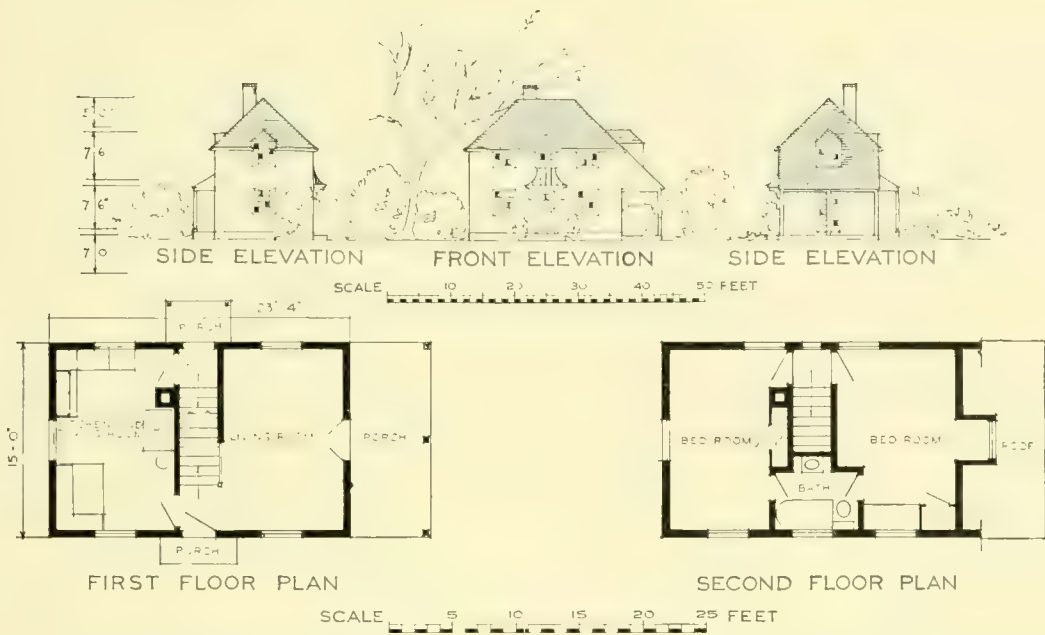
SIX ROOM BUNGALOW

U S H C STANDARD TYPE H

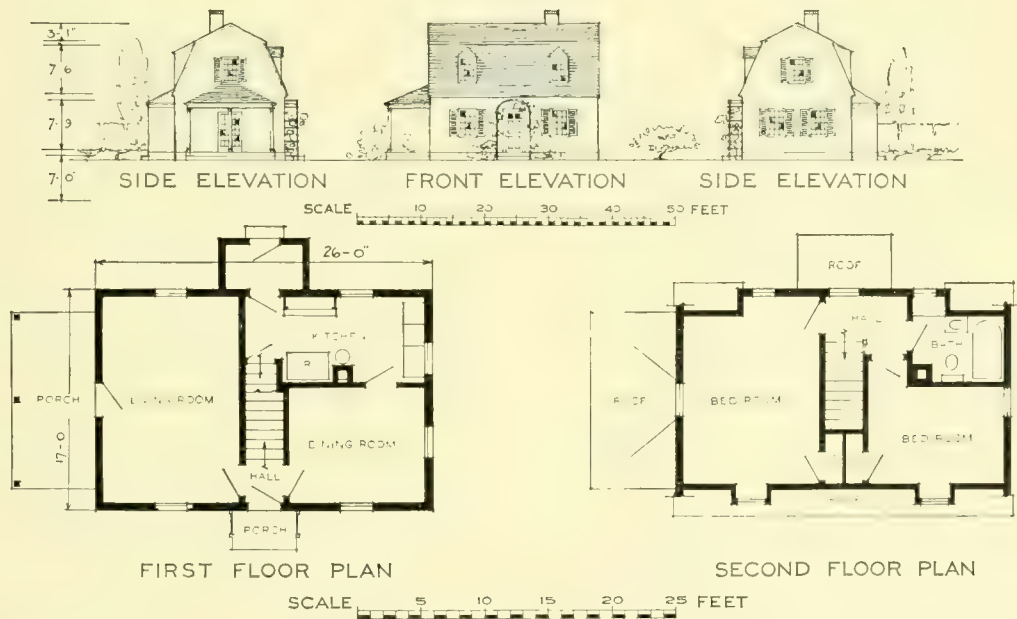
UNITED STATES HOUSING CORPORATION



UNITED STATES HOUSING CORPORATION

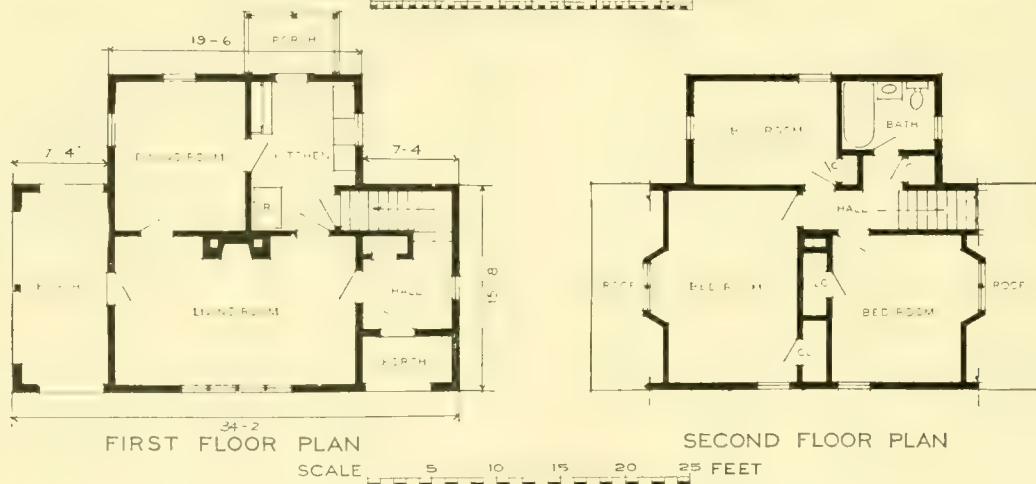
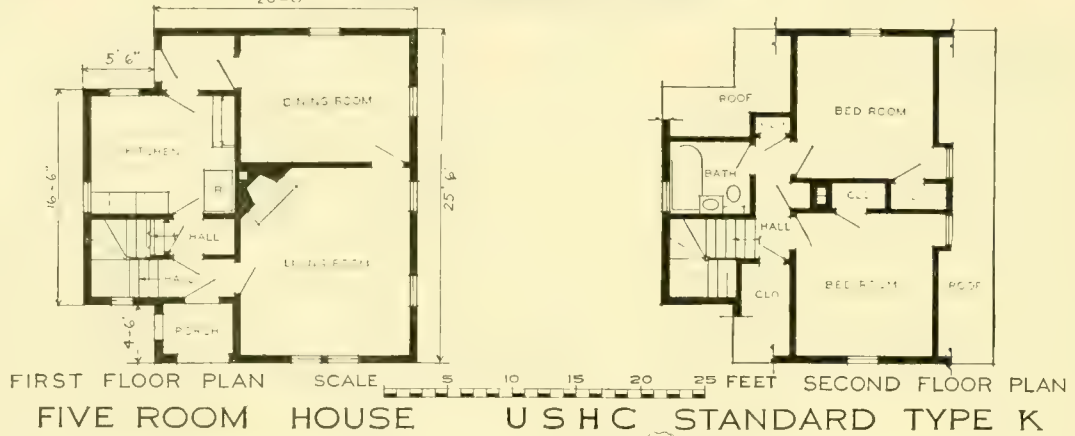


FOUR ROOM HOUSE U S H C STANDARD TYPE I



FIVE ROOM HOUSE U S H C STANDARD TYPE J

UNITED STATES HOUSING CORPORATION



SIX ROOM HOUSE U S H C STANDARD TYPE L

UNITED STATES HOUSING CORPORATION



SIX ROOM HOUSE

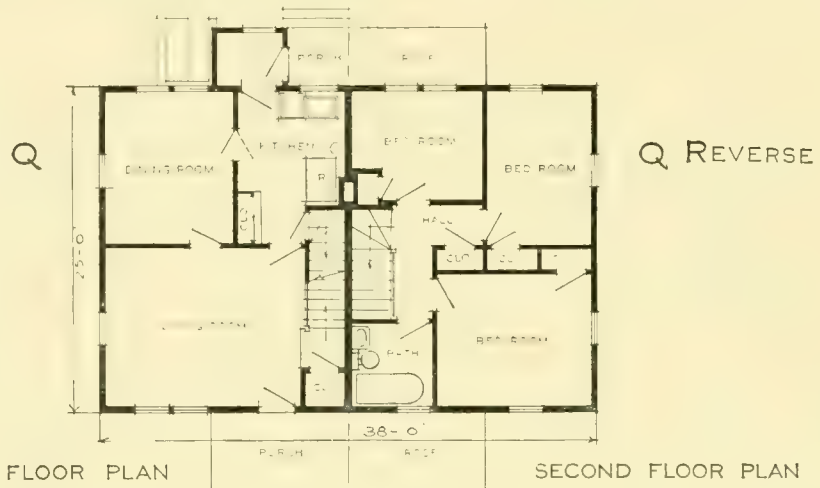
U S H C STANDARD TYPE M



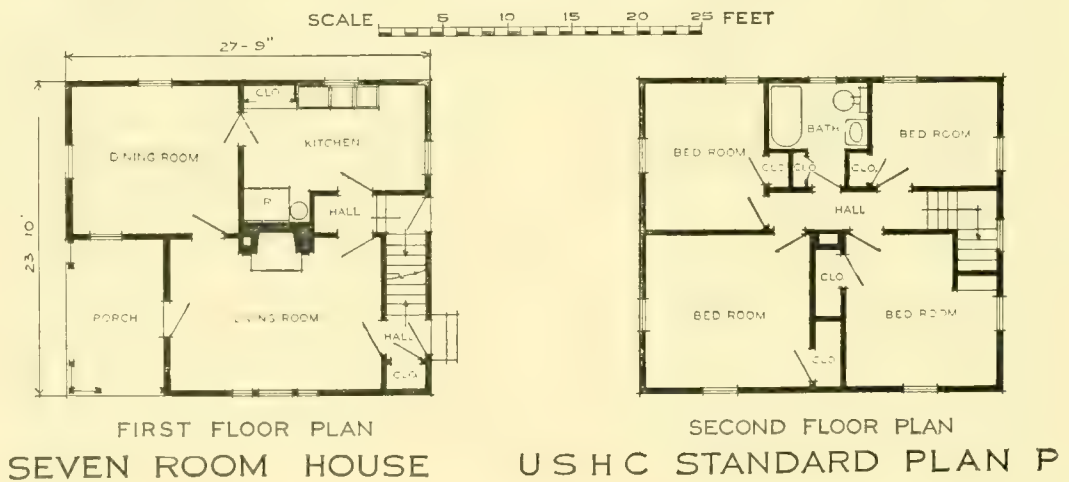
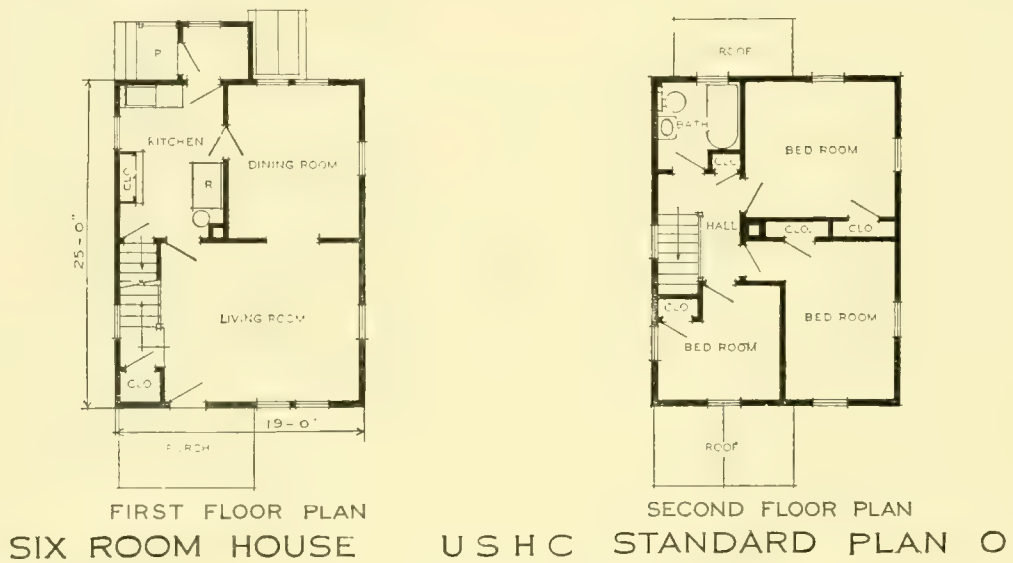
SIX ROOM HOUSE

U S H C STANDARD TYPE N

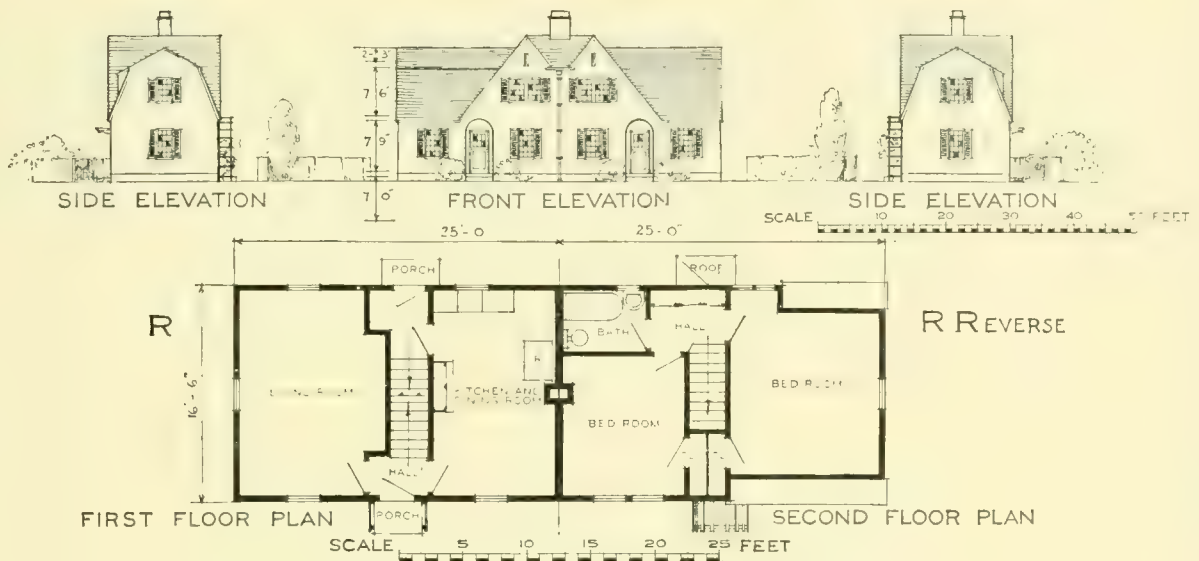
UNITED STATES HOUSING CORPORATION



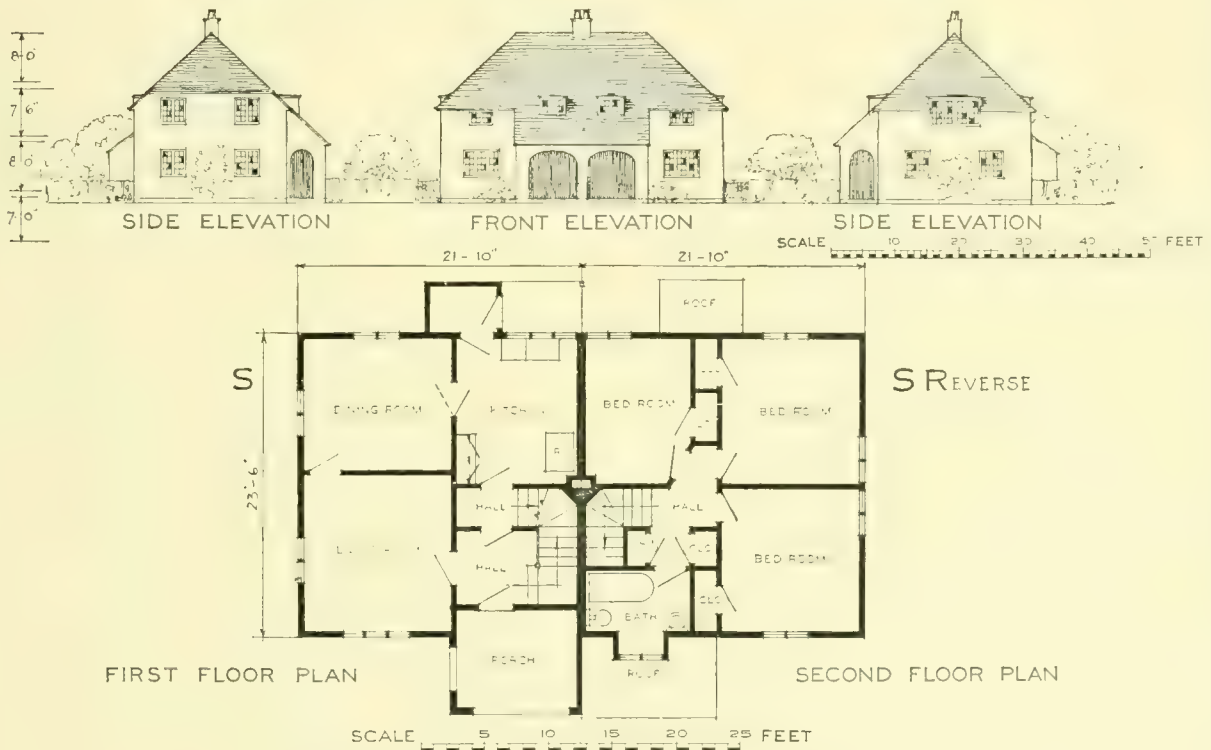
SEMI-DETACHED HOUSES U S H C STANDARD PLANS Q AND Q R



UNITED STATES HOUSING CORPORATION

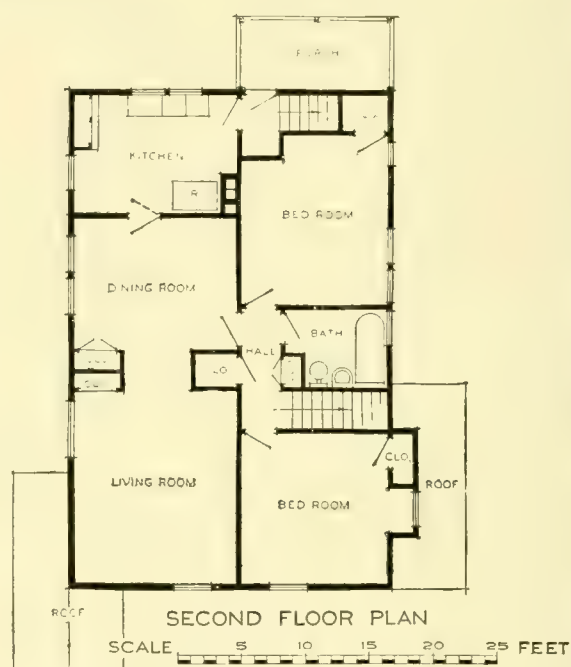
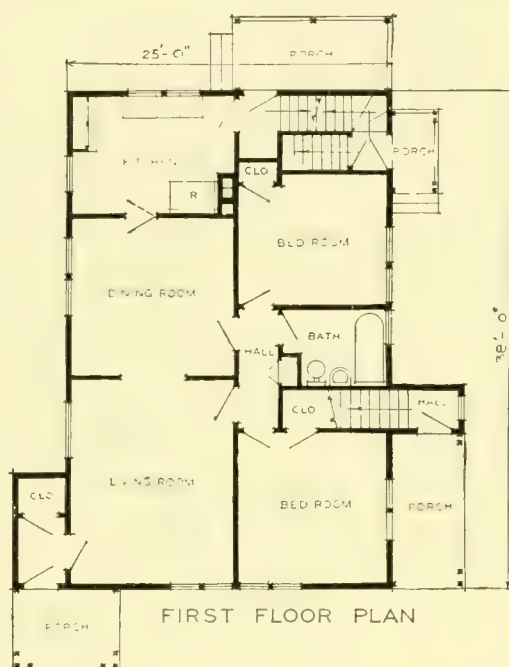


FOUR ROOM SEMI-DETACHED HOUSES
U S H C STANDARD TYPES R AND R R



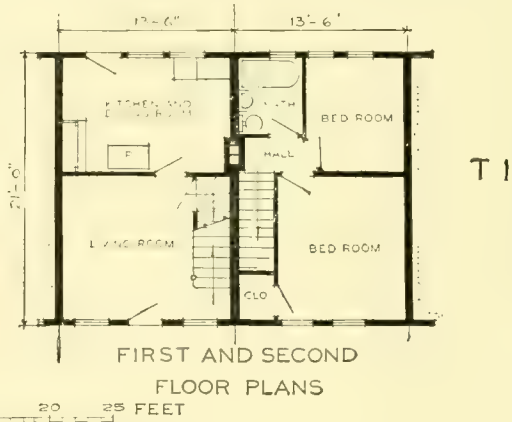
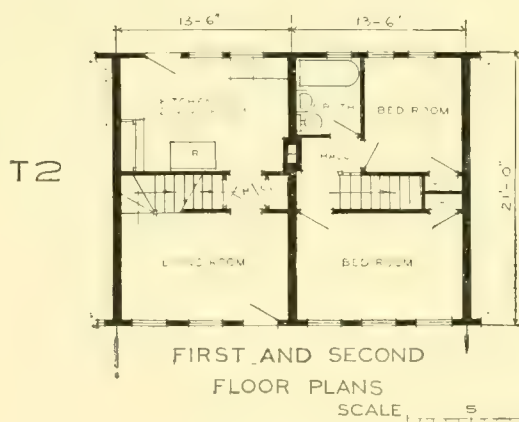
SIX ROOM SEMI-DETACHED HOUSES
U S H C STANDARD TYPES S AND SR

UNITED STATES HOUSING CORPORATION



TWO FLAT HOUSE

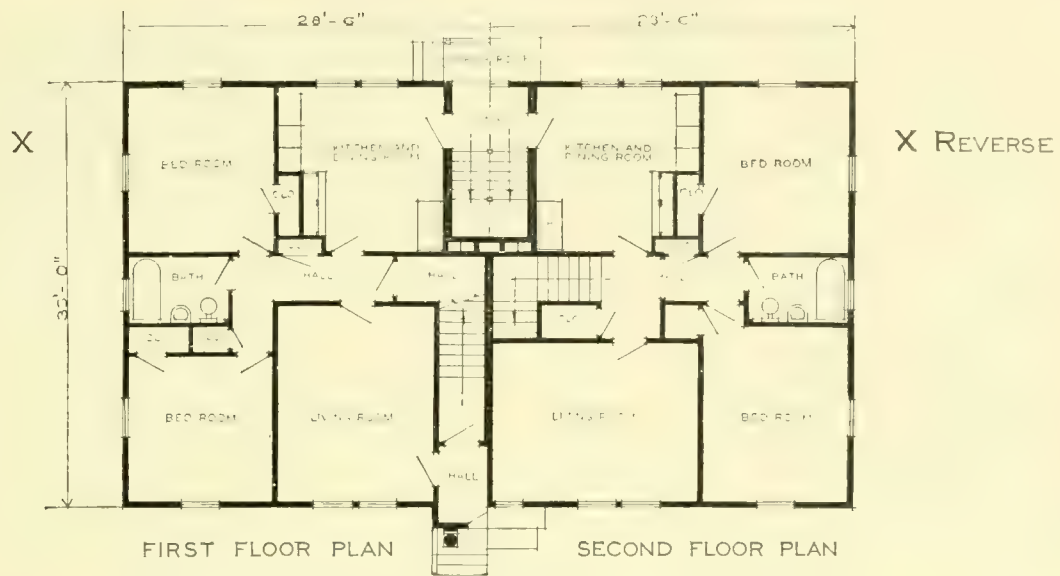
U S H C STANDARD TYPE W



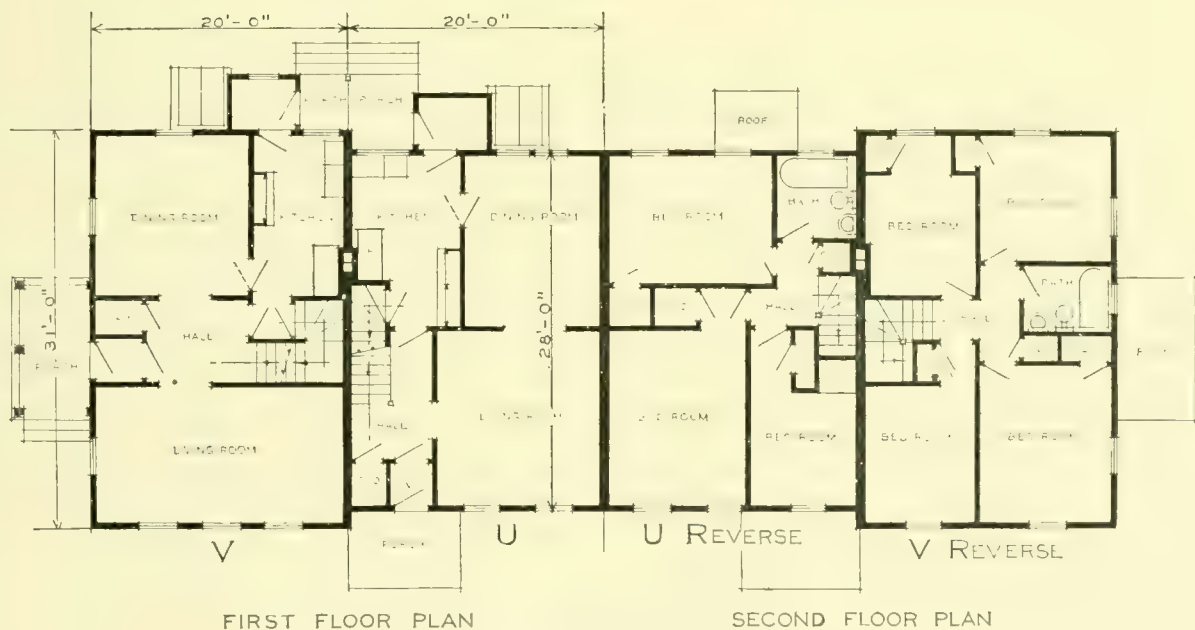
FOUR ROOM ROW HOUSES

U S H C STANDARD PLANS T1 AND T2

UNITED STATES HOUSING CORPORATION



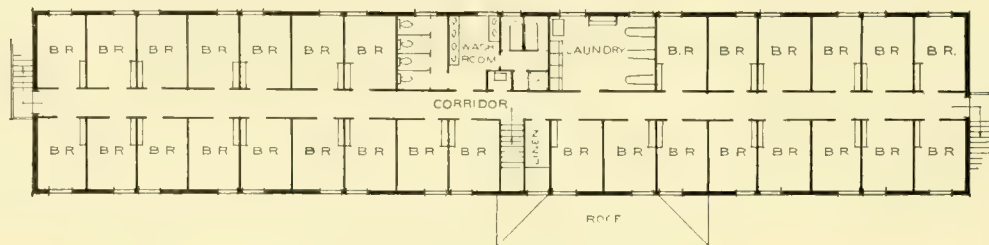
SEMI-DETACHED TWO FLAT HOUSES
U S H C STANDARD PLANS X AND X R



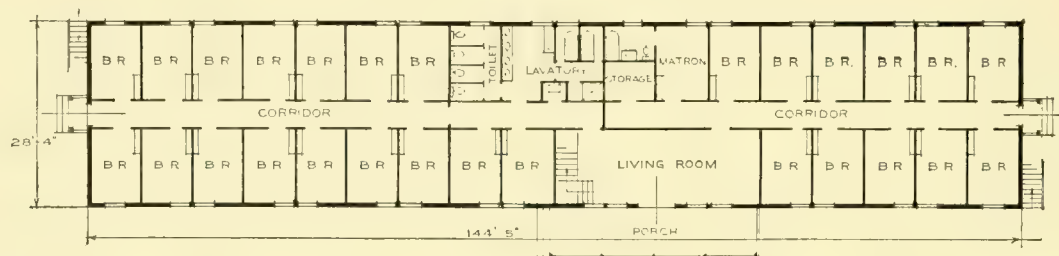
SIX AND SEVEN ROOM ROW HOUSES
U S H C STANDARD PLANS V AND U

SCALE 1" = 5' 10' 15' 20' 25' FEET

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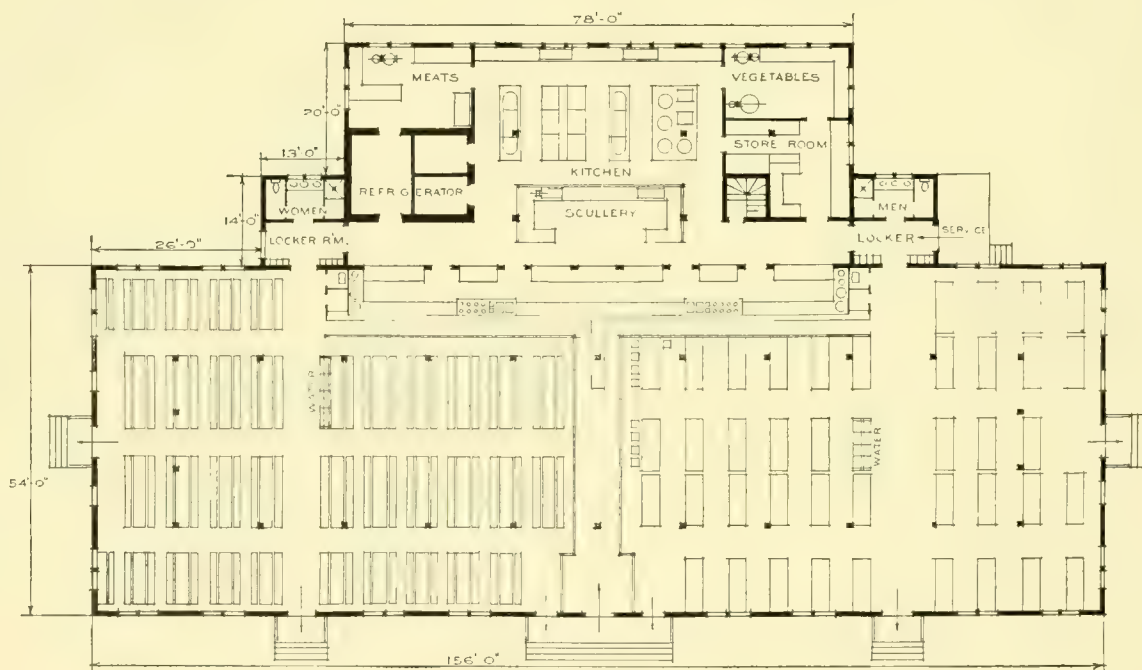


SECOND FLOOR PLAN



FIRST FLOOR PLAN

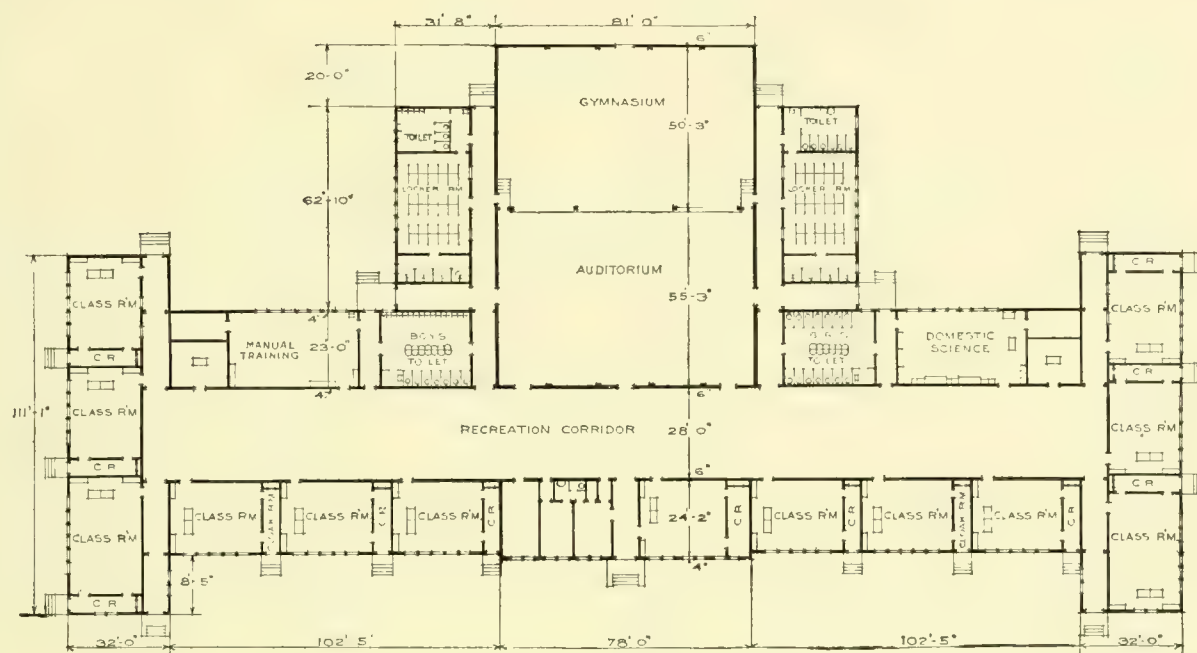
DORMITORY U S H C STANDARD PLAN



CAFETERIA U S H C STANDARD PLAN

SCALE 10 20 30 40 50 FEET

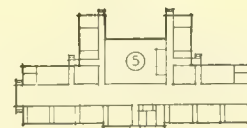
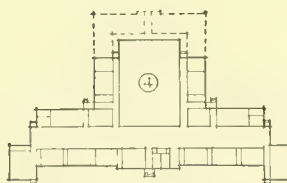
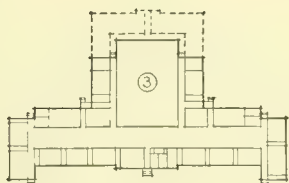
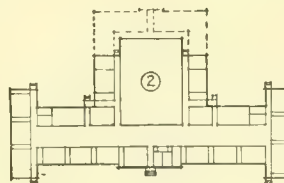
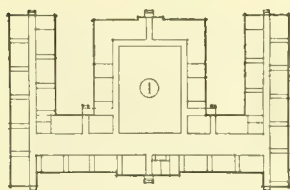
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FLOOR PLAN

SCALE 10 20 30 40 50 60 70 80 90 100 FEET

SPECIAL SCHOOLS



KEY PLANS

SCALE 50 100 150 200 250 300 FEET

UNITED STATES HOUSING CORPORATION

effect of this economy is illustrated on p. 65, a drawing of a street in one of the Housing Corporation projects, where the houses are well designed and grouped, lacking only the finish and color which the addition of these details would have given. The future owner can supply these things, however, and do some additional planting at very small cost.¹ The lower drawing on p. 65 shows a group of houses built by the corporation as they may appear at the conclusion of the present construction contract. The upper drawing shows them as they may appear after some minor additions, extra planting, and a few years of care.

The Architectural Division cooperated with the employed architects in the design of all houses so that they could more quickly be brought to the standards adopted. Many excellent designs submitted suffered revision because of the war economies already outlined, and fall far short of the ideals of their architects. The type of house which might have been built, however, if architects had not assisted with the housing program, is illustrated by a builder's design for a row house of the South Philadelphia type submitted with one of the first requests for Government aid. It was redesigned by the Architectural Division, and the changes were made at a small additional cost per house, the increased frontage being possible because of low land value. The two designs are shown on p. 66. The upper drawing was the one submitted and the lower the one erected.

COMPARISON OF CORPORATION REQUIREMENTS WITH CURRENT METHODS.

In the standards of the Housing Corporation, types well established in certain localities were omitted because they did not afford satisfactory living conditions or because they might be economically replaced by better types. The most notable omissions were the "three-deckers" or detached wooden tenements of New England, the three-room-deep row house of Philadelphia, and the two-flat house found in New London, Conn. Although it is possible that a "three-decker" might have been designed overcoming some of the worst faults of the type, it would have still remained a serious fire hazard. The same density per acre at the same or lower cost per family with a proper division of yard space can be obtained in the row or group house, the

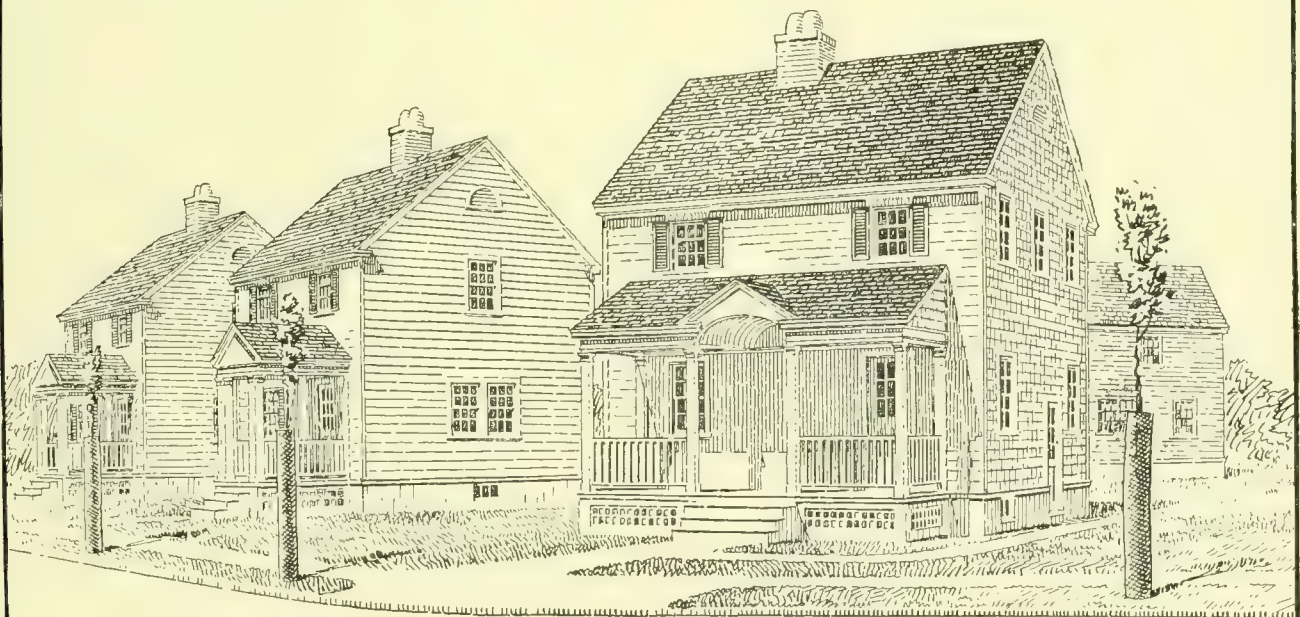
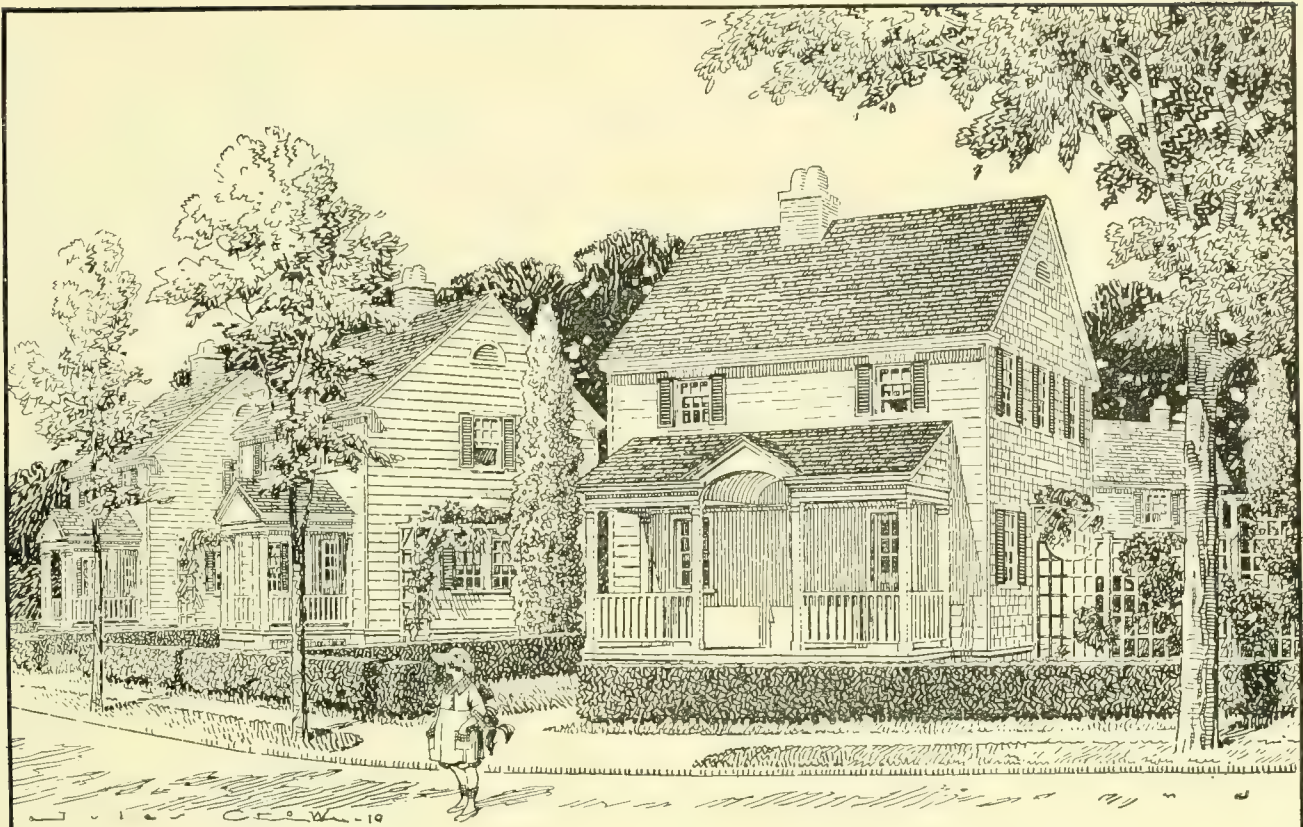
two-flat house, or the two-room-deep apartment house used at Bridgeport. In the cases where individual houses did not offer a satisfactory solution the apartment was used. The Philadelphia row type, generally three rooms deep, has two badly lighted and badly ventilated middle rooms and a bathroom with only a skylight. These faults are remedied in the two-room-deep house. An ingenious scheme of plan avoiding the disadvantage of the deep row house was developed in the Washington, D. C., South Capitol Street project, where light and air for the deep houses was insured by alternating with a shallower type of two-family house. The New London two-flat type, which has an extra room in the attic for each family, was rejected because of the common stairways resulting. In cases like Briarfield, Newport News, Va., and Elizabeth, N. J., where spacing of 4 feet or less between semidetached houses was customary, a row type was adopted as land costs prohibited the use of the semidetached house throughout the project with proper spacing. The closest spacing actually used was at Truxtun, Va., where detached two-room-deep frame houses were placed 11 feet apart. This spacing does not look too close as actually constructed. All buildings, except apartments, were set back from the street line and separate rear yards were provided for all dwellings except tenements.

INFLUENCE OF LOCALITY.

In addition to the effect of climate on the design of houses, there was the important influence of local custom. Investigation of the requirements of workmen in different localities showed generally a preference for established local types. In the Middle West and on the Pacific coast it was the bungalow; in the smaller towns, single or possibly semidetached houses; while the workmen in the Philadelphia Navy Yard would consider nothing but the row house. As the houses were to be occupied by these workmen, their wishes were complied with so far as their earnings indicated their ability to pay for them.

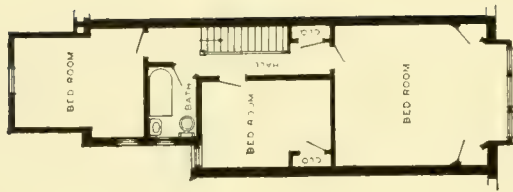
In order to lessen the burden on transportation facilities, materials available in local markets were given preference, even at increased cost in some instances. Where brick and terra cotta were manufactured in quantity they were used for exterior walls; slate sometimes replaced the usual asphalt slate-coated shingles, and plaster board the usual spruce lath.

¹ In several cases some of these omitted details were replaced after the Armistice to increase the salability of the house.

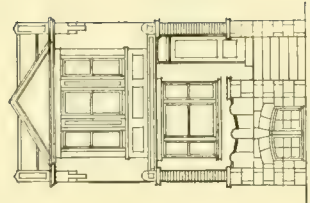


UNITED STATES HOUSING CORPORATION

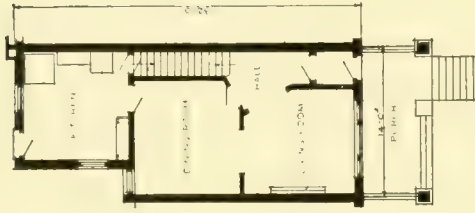
EXAMPLE OF EFFECT OF PLANTING
AND MINOR ARCHITECTURAL DETAILS



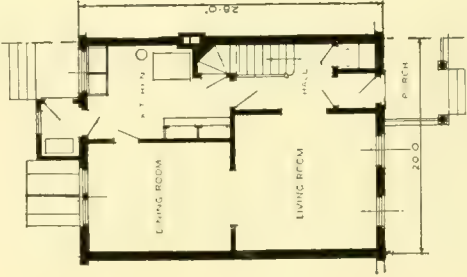
SECOND FLOOR PLAN



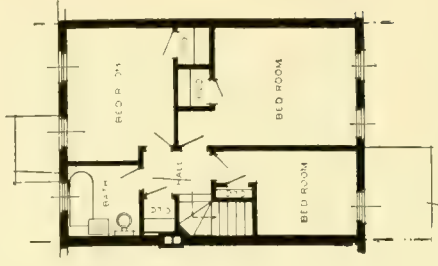
FRONT ELEVATION



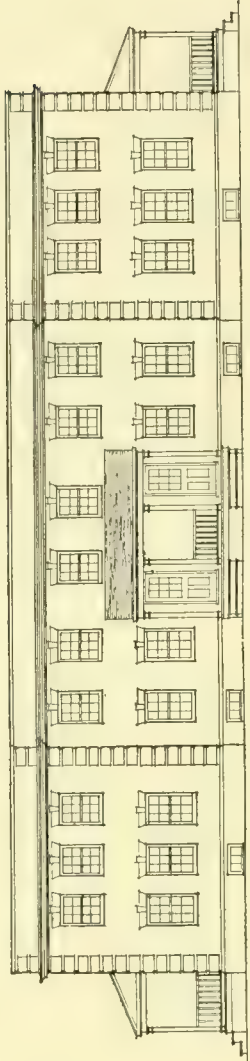
FIRST FLOOR PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN



FRONT ELEVATION



UNITED STATES HOUSING CORPORATION

In congested localities where the row house and the apartment house were the predominant types, brick was generally used for the exterior walls. It reduced fire risks, and where smoke would make a stucco surface unsightly and necessitate the frequent painting of wood, the use of brick reduced maintenance charges.

MATERIALS SUBSTITUTED FOR ECONOMY. CONSERVATION OF WAR MATERIALS, AND RAPIDITY OF CONSTRUCTION.

The rulings of the War Industries Board restricting the use of metals and other building materials, the urgency of speed in construction, and the necessity for using materials available in quantity, or capable of quantity production, sometimes forced the adoption of materials and methods of construction not customary in the best practice. The restriction in the use of metals, which at first affected only copper and lead, later limited the use of steel and of zinc, which had been adopted as a flashing material after tin and galvanized iron were no longer available. This required the avoidance of flashing by special details of frames and the use of asphalt-coated flashing in many cases. Gutters and downspouts were made of wood where they could not be omitted entirely, and deck roofs, ordinarily tin, were covered with canvas or more frequently with some prepared roofing.

The conservation of metals became a most vital question. Plumbing was arranged for the minimum use of pipe, even at the expense of some features in the plan. All fixtures were arranged to have the shortest possible runs to the stack and the kitchen range with the hot-water tank was placed so that the runs of supply pipe were reduced to a minimum. In all dwellings, except where superimposed bathrooms occurred and where fixtures were more than 10 feet from the stack, all venting of traps was dispensed with and cast-iron drum traps were adopted. After thorough tests had proved that the seal could not be destroyed by syphoning,¹ a special fitting was adopted for bathroom waste connections by which all the connections to the stack were made with a single fitting. Galvanized wrought-iron pipe was used for all waste pipes. An example of very economical plumbing is furnished by the Waterbury (Conn.) project, where the arrangement of fixtures is excellent in the individual houses, and where in addition the pipe for every

house in the project was cut from one set of roughing-in measurements.

For houses of the size generally built hot air offered a thoroughly satisfactory system of heating. It was adopted because of small initial cost and economy of metal. Electric wiring was reduced to one outlet in each room with switches for the hall light only.

The use of white paint except for exterior trim was prohibited because of the shortage of lead and zinc oxide. Chrome yellow and green were held for the exclusive use of the Army for camouflage purposes. Interior woodwork was given one coat of an oil stain for protection until such time as the supply of materials would allow finishing with varnish or paint. Shingles without paint or stain were used for exterior walls in many cases where the climate gives a good color from weathering.

PLAN DISPOSITION.

As has been suggested, the selection of a particular type of house was often influenced by the desires of the workers, even though the type desired had no particular material advantages over some other possible types. In many places mechanics insisted that they would be contented only in detached houses, and very reluctantly admitted even the possibility of the semidetached house. It was however often the fact that they could not afford more than the rent of the latter. Economy of construction would therefore have dictated nothing lower in density per acre than the semidetached two-flat house or the row house. So that in the selection of type plans a proper balance had to be struck between the workman's desires, the need for large numbers of houses from a limited appropriation, and the future value and salable qualities of the house, as seen by the local real estate dealer.

The largest factor determining the price of a dwelling, after a reasonable writing off of excessive war cost, was the prospective tenant's salary. The actual cost of the finished dwelling was made up of the land cost, affected by the density per acre, the cost of utilities and other improvements outside of the house, and the construction cost of the house. The question of the costs of all the construction entering into the town plan is discussed in Chapter VII. In the present chapter we are considering costs of the house alone.

¹ See record of plumbing tests, p. 512.

The cheapest dwelling constructed was the row two-flat house, a close second was the semidetached two-flat house. Next came the row house, which indeed was cheaper than the semidetached two-flat house in cases where land values or utility costs were especially high. Ordinarily not more than eight houses were used in a continuous row—the open spaces between these short rows avoiding the dreary monotony generally associated with row houses. It became evident that apartments and large tenement houses could not be built as cheaply as any of the foregoing types, as general construction, plumbing, and heating were necessarily more elaborate. Next in line was the detached two-flat house and the semidetached house for one family, costing about the same, the latter more desirable for families with children. Reference to the standard row house brings out a problem which developed in a number of cases, i. e., service entrances from the front, where there were no alleys. Examples are shown in the houses at Bridgeport, Ridley Park, Alton, and Bethlehem.

For economy and rapidity of construction it was advisable to limit the number of types in a project as far as possible. In grouping the houses variety was obtained by reversing plans, by rotating the plans 90°, by changes in roof and porches, and by composing different types, as semidetached houses. This variation was carried so far in some projects that in a whole street frontage no two silhouettes appeared the same in spite of the small number of plan types. This extreme variety, however, was not satisfactory in effect, and the projects which are most pleasing in appearance show a repetition of houses of similar size and character with modifications at intervals for accent. Semidetached houses, in general, produced a better effect than detached, because the units were longer, more pleasantly proportioned, and had better roof lines. Interest can be lent to a succession of houses by change in wall materials and by variety in the detail of porches and doorways. Unquestionably the changing of details between neighboring houses and in general variety in design entail some increase in cost. Nevertheless, if it is done intelligently, this cost may not be great, and it is certain that the real value of the development is increased by the more attractive appearance.¹

GENERAL OBSERVATIONS.

Under the necessities of war, certain forms of construction were decided on which in peace time would not have been resorted to.

The War Industries Board was the final arbiter in nearly all cases as to forms of construction and materials. Naturally, the policies which they determined from the point of view of general economy of material and transportation did not always produce results which were satisfactory from the point of view of our particular housing developments. In the light of our experience it is obvious also, now that the war is over, that, as was inevitable, some errors were made and that some construction, though it aimed at economy, did not so result.

In the descriptions of the dwellings for each project, certain features particular to the project have been noted. The general faults, however, if faults they may be called under the circumstances, common to all or at least to a great many of the Corporation's developments, are sufficient in number and importance to be discussed here, so that the prospective builder may be warned against using the so-called Government standards (both design and construction) without careful consideration of those deficiencies which were compelled by the war. In speaking of these defects in connection with the Government housing, we are in many cases calling attention to faults common also to a very large percentage of prewar houses built privately,—houses which though cheap to build are costly to own because of the repairs consequent to inferiority of construction, or inconvenient to live in on account of poor design.

For example, let us consider the plans generally. We note many rooms which, while perfectly livable, lack in size just the few square feet required to give real comfort. These few feet save a large amount of money in the aggregate of all the houses built, but the money would be well spent under ordinary circumstances in providing the extra accommodations.

The same comment is applicable in many cases to porches. Similarly a large saving was effected by omitting the finish in attics, where oftentimes there was sufficient space for an extra room which if lighted by a dormer window would have been at least as comfortable as a small room on the second floor.

¹ See also Chapter VI, p. 73.

But the greatest savings were made in materials, lumber, and millwork, including both the quality and kind; also in the design of moldings.

Attention should be called to the many roofs which have insufficient pitch to drain properly. A roof with insufficient pitch will leak unless the roof covering is such as is usually placed on flat roofs. With such materials as slate, asphalt shingles, and wood shingles, a roof with a pitch of less than 30° is bad. In the case of wood shingles it is specially bad, as, besides the consequent decay to the construction of the roof, the shingles themselves rot so quickly as to require renewal in a few years.

Flashings in many of the Government projects are of other materials than metal, for metal was the scarcest of all war material and most requisite for the war. Flashings should be of tin or, better yet, lead or copper, as those last two materials are practically everlasting. For flat roofs, too, copper is much to be preferred. Many of the projects are built on sites of such soil formation as would ordinarily require that the cellars be waterproofed, but in no case has this been done. Where cellars are dug in clay or rock or shale, it is advisable to waterproof not only the outside of the cellar walls but also under the cellar floors. Tile drains at the footings are of great value, but where water pressure is likely to exist the tile drains are not always sufficient.

It is inadvisable to stucco walls down to the grade level, as was done on some projects. Capillary attraction causes moisture from the earth to permeate the stucco and frost cracks it off of its backing.

When a chimney flue is required to be 8 by 8 inches or 8 by 12 inches no part should have less than that area. It seems almost unnecessary to state this, but the error occurred sufficiently often among the thousands of houses built for the corporation, and it occurs in common practice to such an extent as to be worthy of note.

The millwork on moldings furnished for the corporation's houses is, generally speaking, coarse in detail and poor in quality. There are but few exceptions. It was considered necessary as a war measure to use stocks on hand with the mills rather than to cut the moldings anew. As a result many of the cornices of houses and many of the other molded parts, such as porches, are too heavy in appearance, by no means as good as the details made by the architects in these cases. This is as true of interior millwork as it is of the exterior.

But, all in all, except where a few houses depended upon their millwork for their refinements, there is no very glaring fault in the general design due to the conditions stated.

The quality of material, however, is quite another matter, and there is so much inferior quality of woodwork that it would almost seem that a great part of the second-grade wood trim and boarding in certain parts of the country must have been used up on the Government's housing. We find siding of such poor quality as to raise the question of the advisability of using it, even in war times, and flooring which proved to be more economical to discard than to use because of the great cost of laying. Lengths less than 3 feet, as a rule, might better be discarded or used in closets.

Exception may be justly taken to the design of many of the knobs and fancy plates with which the doors are fitted. They would have looked much better had they been perfectly plain rather than highly ornamented. They are evidently stock which had existed for some time and the best that can be said for them (as well as the inferior wood used) is that by their use the market is purged to that extent and therefore houses built in future will not have them because they are cheap.

As a rule it is wise to have too much heating capacity in a house rather than too little, but in most of the Government houses the question still arises whether smaller furnaces would not have been sufficient. In connection with the heating, exception may well be taken to the positions of the wood lattice coverings of the cold-air returns in the floors. They should have been placed in side walls, as was done at two of the projects. It would, of course, have helped matters had metal grilles been used, but even in this case the openings might be at corners of rooms rather than in places over which persons are required to pass.

The uniformly high-grade designs of the houses and the care with which they were worked out by the architects leave little to be said in general criticism of them. The few minor details which might be noted are, however, worth consideration for future building.

In many houses headroom on stairs could be bettered by beveling the header beam of the stair-case well.

In all the houses, except in the development at Newport, R. I., no provision has been made for

access to attic spaces. At Newport a ladder was constructed between the studs directly beside the opening in the attic floor. This is a very simple way of getting to the attic.

A great majority of the houses have wooden gutters and down spouts. In cases where the wood gutters are built into the cornice the appearance is much better than in cases where they are hung like a metal gutter. The wooden down spouts or leaders should always receive a coat of asphalt paint on the inside to preserve the wood.

The foregoing criticisms apply to certain instances of the work of the United States Housing

Corporation. In relation to building generally many warning notes could be sounded in the hope of raising the standard of house construction, but this would be out of place in the present report. It is hoped, however, that with the foregoing notes the "housing standards" as used in the work of the Housing Corporation may be of value after the war in suggesting certain economies in the use of materials, and general saving for the house builder, and better housing for the vast number of home makers whose right it is to get a return of a dollar's worth for a dollar spent.



CHAPTER VI.

THE HOUSING PROJECT: ITS GENERAL APPEARANCE.

Good appearance a financial asset—More easily obtained in an isolated or large development—Depends on: Elements, grouping and harmony generally of these elements, relation of whole layout to surroundings—Examples of some simple ways of obtaining consistent good appearance: vistas, enframed open areas, balance of buildings on opposite sides of street, points of interest set off by areas where attention is not strongly attracted, treatment of street intersections, civic centers, districting giving variety and minor unity, color—Examples of some ways of getting variety: form, placing, combining, fronting, and orientation of buildings—Taking advantage of natural features—Special importance in Housing Corporation's work of effects to be got from relation of buildings to one another.

GOOD APPEARANCE A FINANCIAL ASSET.

The Housing Corporation was well aware that good appearance would be a financial asset in the housing developments; that is, we knew that up to a certain point every householder would be willing to pay something extra for good-looking surroundings. But we realized also that in communities of people of modest means, such communities as the Housing Corporation was dealing with, the householders simply can not afford very much expense, over and above what they must pay for the absolute necessities of life, purely for enjoyment of the appearance of their home neighborhood, however much they might desire this enjoyment.

This fact makes it very difficult for any small development of houses scattered among those of an existing large community to do much without financial loss to raise itself above the mediocrity or ugliness which too often surrounds it. But in a large development or an isolated development the case is entirely different. Here all the attractiveness of harmonious buildings pleasantly related, of street systems which have a general unity and a sensible fitness to the ground surface, of avoidance of the mutual nuisances which arise when buildings, often for different uses, are jumbled together in inconvenient relations,—all this can often be had for no extra expense at all over the cost of houses and streets built without consideration of these relations.

If it is thus possible to get a community which has an air of well-being of its own, it is much more likely that the householders will make effort enough to maintain and better its appearance, each in his small way on his own lot. And of course the general pride of the householders in the

attractiveness of the neighborhood is the force by which, in the long run, the appearance of the community will largely be determined.

In this chapter we have set down some of the ways in which we have found that it was possible to obtain some degree of order and attractiveness of appearance without incurring thereby an expense which the kind of people whom we were serving could not afford.

ELEMENTS IN PRODUCING GOOD APPEARANCE.

Of course the good appearance of a neighborhood depends mostly on three things: First, the appearance of the several houses and streets and fences and plantings in themselves, according as they are each well designed and well kept; second, the grouping together of these things to make a good-looking whole; and third, the pleasant relation of this whole layout to the surroundings into which it is set. The first of these points we have touched on in Chapters IV and V. The second and third we will discuss briefly here, as they are more particularly matters of town planning and general design. We are not endeavoring here to write a treatise on town planning esthetics, but merely to cite a few examples to show some of the general principles which we have found most important in our work.

WAYS OF OBTAINING CONSISTENCY.

It will evidently go a long way to help the appearance of a town if as anyone goes along the streets he feels that each new view that he gets, each new neighborhood that he goes through, has some consistent character of its own.

The simplest way to make a street present a consistent "picture" is to have it form a vista. Anyone's natural tendency when in a straight

street is to look down it. There should be something at the end to look at not too far away. In this respect the regular gridiron plan of streets of indefinite extent fails to be satisfactory. Every street in the gridiron is a vista, but no vista has any terminus. In many cases we planned streets with slight angles, or curved, or (in the case of purely local streets) ending abruptly against a transverse street; and arranged the buildings and plantings so that there should be pleasant views along the streets, both toward and from the buildings at the vista ends.

A section of street may be made distinctive by setting the houses close to the street at each end of the section and farther back in the middle, so forming or suggesting an inclosed space into which the houses look and each side of which is a consistently designed group or continuous row of houses. Sometimes where there was land enough we carried this idea so far as to make a neighborhood park or a village green with two roadways and a central grass space (see Bath and Indian Head, pages 106 and 193). The arrangement proved worth while, however, in many cases where the roadway was continuous and the difference in setback of the houses was less than 10 feet (see Truxtun and Aberdeen, pages 290 and 83).

An examination of the executed work, however, shows that in designing such variation in setback the tendency has been almost invariably to overdo the amount of the setback. The effect can often be quite adequately secured by a variation in setback of no more than 2 to 6 feet. Generally speaking, where front porches are used, a variation in setback of less than the width of the porch is more agreeable in every respect than where the porches of the recessed houses fall wholly behind the wall line of the more advanced houses. The amount of recessing which has proved desirable as a matter of appearance depends of course upon the length of the recessed portion; the shorter it is the less can it be recessed, the controlling principle being that the building fronts of the recessed portion should not entirely disappear from sight in the raking views along the street which are ordinarily those of most importance. In these views all projections and recessions from the normal building line count for their full dimensions in depth, whereas their lengths are extremely foreshortened.

A strong effect of consistency of design can be got by balancing a building or a group of buildings on one side of the street by a similar building or group on the other side. In monumental designs where two public buildings can reasonably be made alike there are, of course, many good examples of this. In dealing with small dwelling houses, on the other hand, we felt that a rigid similarity in a balanced composition is apt to spoil the individuality and homelikeness of the private dwellings, and to make the whole street look stiff, set, and institutional.

We found that on the whole in the work that we were doing it was better not to strain after obviously designed effect on every street, but to choose here a retired street for a quiet open space, there a street intersection for a more monumental treatment, and to have a large proportion of more ordinary streets leading up to the points of interest. At Briarfield (p. 258), if the scheme were carried out according to the tentative house location plans as shown, the avenue from the store center to the school, having so much of interest at either end, would probably be better if along its length the houses were more similar and less interesting.

Street intersections are natural places for the designer to put some particular feature of interest, and this was the easier for us to do because we could economically put a larger building on a corner, where it got more light. We found on study, however, that when we were using single or semi-detached houses the only effect that could be got was a pleasant grouping of four buildings about the intersection, and not an inclosure of the intersection like a court. The buildings were too small and the streets too wide to make the latter possible. When we did endeavor to get the effect of a space inclosed on all sides or at one end, we used stores or row houses to make the larger architectural masses needed, and so arranged them around an open area that there was sufficient inclosing house-front proportionally to the openings made by the entering streets.

Where the people to be housed needed public or semipublic buildings like stores, schools, a moving-picture theater, or a community building, and the structures were grouped at an important road intersection, as a matter of appearance this was a very good thing. It gave a definite center and dominant point to the whole design, and the buildings, being



PUGET SOUND NAVY YARD (BREMERTON), WASH.

larger and all serving a public purpose, could be more reasonably arranged for their general effect, perhaps inclosing a "square," as just suggested, or perhaps in a more open group.

VARIETY.

When a project was large enough, and different districts in it were designed for different purposes, this, if rightly done from the point of view of use, gave also naturally a consistency of appearance in each district and variety in the whole project. (See Eddystone, p. 153.) Even when no particular districting was needed, and no difference in the ground made a variety of appearance, something of the same effect was possible by marking the difference between the larger thoroughfares and the quiet local streets, and giving one street, for instance, elms for street trees, wide planting strips and front-line hedges, and giving another street sugar maple street trees, with narrower planting strips and open front lawns.

The choice of the color of paint for the houses, the choice of stucco or brick or wood as a material, and the choice of material and color of the roofs, we attempted to use as a means of making various neighborhoods different and each one consistent. We attempted to use differences of color in a subordinate way to multiply the variation due to differences in form between the houses of a given group. We were convinced that an attempt to get variety by using different colors of paint on houses which were all alike in form was likely to look forced, and that it was better to accept the similarity of house form as making the whole neighborhood consistent in appearance. We could still relieve the houses by different minor details of color of trim or form of porch or roof, and especially by planting of different vines to grow on the houses and different trees and shrubs, and by the use or omission of hedges or fences, and informal shrubbery along the front boundaries. It was probably in respect to color and texture of roofs that the limitations on material imposed by war conditions most conspicuously and unfavorably affected the appearance of our projects, as notably in the case of Cradock.

Much variety can be and was obtained with little or no expense by repeating the same house plan, but placing it with its side or with its end to the street, by reversing it right for left, by ringing a series of changes on the location of porches, and finally by using more than one shape of roof.

A consideration of all the projects, when they were sufficiently near completion to indicate their final appearance, made it very clear that an unpleasant monotony among the houses of a large project can be avoided by the skillful use of architectural variations surprisingly few in number and surprisingly limited in their range of architectural character (as, for example, at Watertown and at Aberdeen); and that any effort at a greater variety in the houses than can easily be obtained by such simple methods is apt to result in one of three unfortunate ways. The least unfortunate is a mere waste of effort and expense in producing a needless number of different plans all of an excellent sort, when two or three, with a few interchangeable variations, would accomplish the purposes. The second is the admission of confessedly inferior designs, of otherwise harmonious and acceptable sort, under the mistaken impression that the number of type designs must be increased. The third is the mingling of designs so different as to appear restless and forced, or even so different as to appear clashing and inharmonious. The introduction of such striking differences between the houses of any group or neighborhood, especially if the same striking difference is repeated several times, does not overcome the most serious aspect of monotony in a housing development, namely, the suggestion of institutionalism. It rather emphasizes the repetitive character of the work by appearing too loudly to deny it; whereas if the differences are not very striking, if there is no noticeable effort at differentiation, the fact that the modest and pleasant variations often repeat is not conspicuous.

TAKING ADVANTAGE OF NATURAL FEATURES.

When there was any existing natural beauty, either on our own land or visible from it, of course we did what we could to preserve it and display it to the best advantage.

We endeavored to preserve as parks and public spaces of various kinds, where these were needed, the most attractive bits of landscape that we found. Fortunately, the roughest land, and that with brooks and large trees, is likely to be both the most interesting to look at and walk through, and the most expensive to build on, and so on both counts best fitted for public reservations. We also studied carefully the distant views from our property, and where possible arranged that the best of them should be enjoyed not only from house windows

but from some public resting place. (See Quincy, p. 326.)

Similarly, if there was some ugly object near our development, we endeavored to screen it with planting, or turned the back of the layout upon it, if this was practicable.

Smaller natural features also we preserved where we could reasonably do so, even diverting a road to save a picturesque group of trees. (See Bridgeport, p. 125, Forest Court; Niles, p. 267, junction of La Fayette and B Streets.) This can be carried too far, however, for if a road is permanently made crooked to save a tree, when the tree dies—as it will, and probably all the sooner for the presence of the development—the crook in the road appears unreasonable.

It is especially difficult, where the houses have to be close together, to save many existing trees or other natural features, and for this reason we chose open and rolling areas for our housing sites where possible, in preference to more beautiful broken or wooded areas, for we knew that the greater natural beauty would prove only an added construction expense and be lost in the end when the project was completed.

IMPORTANCE OF GENERAL EFFECT OF BUILDINGS.

Our experience has led us to recognize two errors, which are especially to be avoided by the designer in planning the appearance of a community,—important errors, which may spoil the sale of the development. First, in seeking a unified effect the designer should not make all the houses and lots so much parts of one set and formal design that they look like a penal or charitable institution. Second, in seeking interest and picturesqueness he should not make all the houses so different, and each so unusual, with so much done evidently for

effect, that the whole looks like a village on the stage. Neither kind of development would find a ready market, and the reason in both cases would be at bottom the same: that people in this country want to live in independent, self-sufficient homes of their own in a real, complete American town, which they understand and run in their own way, and they do not want their houses to be, or to look like, parts of an artistic or sociologic experiment.

This is an example of the money value of what is indefinitely called the “tone” or “character” of a development, that is, the total effect made on the observer by its appearance. We were aware that it is possible to produce an unattractive character by overemphasized design, but we were convinced also that the character of our developments would be still more unattractive without the consistency of appearance due to simple and reasonable design. This belief had some influence in our avoidance of certain sites in a few localities where, because of existing structures, no consistency of design was possible in the new development.

The houses which can now be built for people of modest means are smaller than in the past, and in the less expensive suburban communities they have to be set close together to economize land and utilities. The relation of one house to another in appearance is therefore especially important in this kind of development, and there is an evident advantage from the point of view of appearance in planning a development not scattered among existing houses but all in one piece, so as not to have small houses dwarfed by large ones, simple houses overpowered by ornate ones, or decent houses spoiled by shabby ones, and the whole spirit of the new work frittered away and lost by being mixed with buildings of another kind.



CHAPTER VII.

THE HOUSING PROJECT: SOME CONSIDERATIONS AS TO COSTS AND TYPES OF DEVELOPMENT.

Few communities before the war planned completely—Few satisfactory figures for general cost estimating available—Housing Corporation needed some system of rapid preliminary estimate of cost of projects—Division of cost factors into classes according to unit with which they vary—Tabulation of estimates—Notes from the experience of the Housing Corporation on: Street systems, alleys, sidewalks and front house-walks, lots—Use of Housing Corporation's data.

In this country, up to the time of the war, few communities or considerable parts of communities had been planned in any complete or comprehensive way, with a consideration and balancing of all the various factors which together make the community a desirable or an undesirable place in which to live and a good or a bad investment of the money spent to construct it.

In almost all cases communities have grown by private initiative, piecemeal, each addition of a house or a street or a newly subdivided area being considered for itself alone, with the scantiest thought of its relation to its surroundings or of its effect on the welfare of the community as a whole, and this has been almost inevitable, for the private lot owner, and even the large land development company, could not afford the time or the money to determine what should be the best development of the whole community, nor could they be assured in any way that such development would occur, if they could know what it should be; nor could they usually in any case afford to add to the essential costs of their own development all the expense which might be required to make it serve best as a part of an ideal general scheme.

Even in those cases where a new development was to stand alone and was not complicated by the existence of a previous community, it has almost always been built by private interest to serve a private end, and was studied for itself alone without any particular attempt to evolve a method of procedure or a standard of judgment which would have much general application. There were of course in the minds of some people concerned with town planning some general principles in this regard, but there was very little available information about

actually constructed and estimated communities to which a designer could refer.

PRELIMINARY COST ESTIMATING.

It was necessary for the Housing Corporation to determine on some system of estimate whereby alternative schemes for the same project might be compared with one another as to probable cost, and this system must be applicable to preliminary plans, for we had no time to draw up detailed plans and estimate them in detail before finding out which of several alternative schemes would be best in a given case. Of course the question of appearance and the still subtler question of fitness to the desires and prejudices of the expected householders could not be stated in figures and had to be judged in each case in the light of the experience of the designers applied to all available information. Also the question of upkeep—what would be the annual cost directly to the community of maintenance of the public holdings, and what would be the cost to private owners for house and lot maintenance—could be judged only in a general way. It was always a question how far the future community would pay in money for good upkeep and how far it would pay by tolerating shabbiness and bad upkeep.

But the first cost—the other side of the account to be balanced against the predictable desirability of the development—had to be estimated with some approximation to accuracy and compared with the available appropriation before even the preliminary plans for a development could be honestly approved by the Housing Corporation. For the purpose of these estimates of preliminary plans, then, we divided the various construction costs of a community into the following classes, dependent in

each case on measurements and figures which could quickly be obtained from the preliminary plans:

COST FACTORS.

First, there are those costs which can be conveniently calculated roughly according to the total acreage of the land to be developed. These are, mainly: first cost of the land acquired; cost of general clearing the ground, general forestry, tree cutting, etc.; cost of general grading, surface drainage, special storm sewers, and subdrainage, if any. Even if some of these operations do not cover the whole of the land to be developed, still they are more or less a benefit to the whole of the land, and therefore in estimating the whole development they are the same kind of cost as the cost of the raw land. That is to say, they are gross acreage charges.

Second, there are those costs which can be calculated roughly according to the length of the streets. These are, mainly: cost of road surface, planting strips, sidewalks, curbs, and gutters, all these depending also on the typical cross section of the street; cost of street lighting; cost of water distribution, mains and fire hydrants and fire connections within the development, of street sewers within the development, and of gas mains, all exclusive of house connections. Where any of the utilities are not laid out in the streets they will usually have to be estimated by themselves.

Third, there are those costs which can be calculated roughly according to the number of families housed. These are, mainly: total cost of houses (but, of course, there must also be known the different house types and the cost of each type); cost of lot development, including grading, planting, fences, paths, and garage entrances, if any (but there must also be known the average size of the lot and the type of development); cost of water connections and sewer connections (but there must also be known the type of layout and thus the average distance between the main and the house).

Fourth, there are those costs which, while they occur outside of the development, must be charged in whole or in part to the development as a whole; that is, must be ultimately pro rated on the families in the development. Such costs are, for instance, roads necessary to connect the development with the town or with a factory or railroad station, sewer outfalls, sewage treatment facilities, water mains, reservoirs, pumps, or tanks necessary for adequate

water supply and fire protection. On these things especially, but on all public utilities in general, the question of sharing expense between the new community and any other community will be one of careful general estimate and negotiation.

Some costs are covered by annual charges against the householders and therefore form no part of the capital value of the development chargeable against cost of lots. Such costs are mainly and usually gas, telephone, house lighting, and water for private use, also such other things as may be built by the municipality and paid for out of the tax rates, for instance, schools, public buildings, the improvement and maintenance of public parks, provision for street cleaning, garbage collection, policing, and fire protection. Variations in cost of installation of such elements due to differences in the town plan, provided they are within the limits which will be absorbed by the public utility companies or municipality without affecting the established rates, do not affect the economy of the plan for the householders. But in case the peculiarities of a town plan involve an extra capital cost in such installations, which will not be absorbed and carried by the established rates, this extra cost must be prorated as a part of the general development cost chargeable against the lots, and is not to be justified unless the extra value is worth more than the cost to those for whom the development was intended.

Having determined in a general way by some experimental figuring what would be reasonable unit costs to use in each of the above cases, it was comparatively a simple matter to figure two or more preliminary plans and determine if any one showed a marked saving in cost in comparison with what it offered in desirable living conditions. When the detailed plans were figured before the contract was let, of course the estimates were made in more detail, but seldom was any new or unduly large cost discovered at that time which could not be reduced by some change in specification or merely minor change in plan.

TABULATION OF ESTIMATES.

We have set down in tabular form the most important measurements of 128 jobs more or less completely planned by the Housing Corporation, including 45 executed wholly or in part.

The purpose for which these tables were primarily compiled is to show what were the amounts of construction of various kinds—per acre, per



ALLIANCE, OHIO.



NORFOLK DISTRICT, CRADOCK, VA.

linear foot of street, per family, or in any other relation that anyone may care to work out for 128 projects of various sizes, and of various types of design according to location, topography, and use, and to show approximately the relative weight of each of the items for average local conditions.

The prices used by the Housing Corporation in estimating, as well as the actual costs of the work, are of no value whatever directly as data for future work, since the conditions under which they came about were very unusual, confused, and variable not only between one job and another but from day to day on the same job.

For purposes of comparison, however, we have applied to the actual measurements of quantities in the tables certain assumed unit costs identical for all the projects; not because these were the real costs, for they are not—often the real costs are widely different, being sometimes more, sometimes less than these figures—but merely to serve as a unit of comparison between one plan and another, because there is no measure but that of cost, real or assumed, which can be used for the summation of the diverse construction items that go to make the completed jobs which were to be compared. The unit costs thus assumed for purposes of comparison are believed at all events to give approximately the proper relative weight to the several items of cost. We have drawn certain general conclusions based on the facts which are expressed in these tables. Anyone using the tables to help in estimating the cost of similar plans will, of course, determine first what the unit costs probably are for the new case that he is considering, and then adapt our quantities and conclusions to fit his own problem. Since he would be obliged to do this in any case, however we obtained our figures, our assumed cost figures are as good as any others for this special purpose.

NOTES FROM HOUSING CORPORATION'S EXPERIENCE.

These figures of relative cost, taken in conjunction with our opinions as to the relative desirability of the several kinds of projects to the ultimate occupants and to the public generally, seem to support certain conclusions as to the value of different types of development. Some of these conclusions we have here set down. By further study of the tables in conjunction with the plans many other important conclusions can be derived, and it is very desirable that there should be a

much more thorough analysis of the facts here tabulated than could be made between the preparation of the tables and the sending of this document to press.

STREET SYSTEMS.

While on a flat or gently sloping topography the gridiron system of streets obviously gives the least area in streets, the most economical shape of blocks to be cut into lots, and the least length of utilities, it is a fact that under conditions as they usually occur it is possible to depart considerably from a gridiron, even on a reasonably flat ground, without appreciably increasing cost. On hilly ground some layout other than a gridiron is almost certain to be less expensive, because it saves cut and fill, avoids steep gradients, leaves lots more accessible, and may provide street lines better adapted to an economical sewerage system. (See Butler and Mare Island, pages 138 and 215 in comparison with Briarfield and New Brunswick, pages 258 and 233.) This does not take into account the advantages that other systems have over a gridiron in appearance and in the possibility of fitting the roads to the best directions of traffic.

A street system on straight lines broken by moderate angles often has an advantage over one of flowing curves. If a development has its houses far apart, and is on an undulating ground, so that the fitting of the road to the natural surface can be seen and appreciated, then the flowing curves may be well worth their cost, and indeed may save their extra cost in surface construction by better fitting the ground. But when the houses are close together, so that they are the main things to be seen from the road, and especially when, because the road curves are of short radius in relation to the length of the house units, the line of house fronts does not in effect form a curve parallel to the street, the smooth continuous curves of road, planting strip and curb, and sidewalk may look out of place. And they cost more in laying out the work, particularly in setting forms for curbs, gutters, and sidewalks, and in describing and recording property lines, often making this last process several times more expensive as compared with a rectilinear street system.

A careful study of the amount of traffic to be expected and an adaptation of the road widths to this traffic should be attempted in each case. When it can be shown that certain streets need never, as far

as can be predicted, carry anything but local traffic, it is possible to save money, to make a better looking development, and to help in keeping undesirable through traffic away from residential neighborhoods, by reducing these road widths to the minimum practicable for local traffic only. (See street sections, p. 501.) In general, it has seemed best in our projects to make the road surfacing only wide enough for the traffic of the immediate future and, where it is likely that this may increase, to plan the whole street so that the roadway may then be widened.

ALLEYS.

The question of alleys caused more discussion than any other one item of general plan. The faults which in the past have given the alley a bad name are principally that it has been a place of concealment on account of high board fences and angles behind buildings, which collect rubbish and which can not easily be policed; that being partially out of sight and often not under public control its paving and general construction and upkeep is neglected and apt to become insanitary and otherwise defective, tending to infect the neighborhood with the spirit of neglect and disorder; that when land increases in value there is a temptation to turn the alley into a low-class residence street, with all its attendant disadvantages. If for practical reasons of access to the backs of houses an alley is needed, it is plain that all the above disadvantages can be overcome by enough expenditure in construction and upkeep. We started with the attitude that since alleys were an extra expense we would not use them unless they were plainly needed, but that if we used them they must be publicly owned and sufficiently paved, lighted, and policed. There has been nothing in our later experiences to change this conclusion.

This meant that we would not construct alleys in a town which would not accept them as public ways, and that where a town had certain requirements as to alleys before acceptance these must be met. This last was not difficult, for our own requirements were usually more exacting than those of the town. We required, further, in most cases that all parts of an alley should be visible from either one end of the alley or the other at the street, that alleys should be 14 feet wide, and that no board fences or other solid screens should be

built along them. Except where alleys were forced upon us by a preexisting street plan or by municipal ordinance they were introduced only where they appeared necessary either as a means of access to the rear doors of row houses or in a few cases as a means of access to garages not accessible from the fronts of the lots. When provided, alleys were also used as locations for electric pole lines in order to keep the latter off the streets as much as possible.

In most cases where the construction of alleys appeared to be unnecessary and inadvisable, easements were laid out for carrying the pole lines through the interior of blocks. Such easements, restricted against occupation by buildings but not open to public travel, are capable of being converted into alleys and opened to traffic at some future time if necessary; but in the absence of an insistent public demand for alleys, the land covered by such easements is more useful and far better kept if treated as a portion of the individual back yards than if set apart as a strip of no-man's-land like the ordinary suburban alley.

The reason for the alley with row houses is of course mainly that it makes a convenient way of taking away ashes and garbage. Of the alternatives to an alley for accomplishing these purposes the corporation ventured experimentally upon two. One, requiring an unusual house plan, provides in each house a separate door on the street front for such purposes, accessible directly from the kitchen and cellar without going through the living room or front hall. (See Bethlehem and Bridgeport, pages 117 and 129.) The other, justifiable only on the score of maximum economy, involves taking the garbage and ashes out through the front door. (See Bridgeport, page 124.)

It is obviously uneconomical to introduce an alley for the sole purpose of giving access to the rear doors of row houses unless there are in the block enough "inside" row houses (exclusive of the end houses of each row, which have access to the rear by the side yards) to absorb the entire cost of the alley at a reasonable figure per house. This is one of the strong economic arguments against the tendency on artistic grounds to insert occasional short rows in a block largely occupied by detached or semidetached houses, and against the use of very short rows, especially those containing only three or four houses each.



WATERBURY, CONN., SYLVAN AVENUE SITE, LOOKING UP MADISON STREET.

SIDEWALKS AND FRONT HOUSE WALKS.

As most of the householders in our developments go to and from their homes on foot,—at least as far as the nearest street cars,—good sidewalks were essential. Cement concrete surfacing proved usually the most advisable, both because nothing cheaper was nearly so good and because its almost universal use in private land development schemes has made the lack of a cement sidewalk a sort of badge of inferiority, in the minds of many people. Usually, as we have said, we placed the planting strip between the sidewalk and the street.¹ When the houses are close together and the population large, the question of house paths and paths from sidewalks to street becomes increasingly important. Since every house must have at least one entrance path, while, particularly where few automobiles are kept, only a few paths in a block from sidewalk to roadway are essential, it saves walk-paving to widen the planting strip at the expense of the front yards, and put the sidewalks nearer the houses. Sometimes, particularly when row houses were set back in groups from the street, we planned a separate common entrance walk, serving all the house entrances in the group, both saving construction and improving the general appearance as compared with a large number of long parallel front walks close together. (See Bridgeport, Crane, p. 125.)

LOTS.

The essential unit of the population which we were attempting to house being the individual family, the essential unit of our subdivision of the land for housing was the private house-lot. This was not the case with the dormitories, boarding houses, and apartments, but the dormitories were largely temporary, and the boarding houses and apartments occupied only a small fraction of the area which we developed.

Our economic problem in the layout of our projects was, then, to arrange our design so as to produce the maximum of land in good accessible house lots at a minimum of expense. Evidently, the smaller we made the average lot, the more families we could house per acre, and the less would be the expense per family for land and development. The limit to this crowding was set by our decisions as to the amount of light, air, and clearance between houses, front, back, and sides,

which we would tolerate as a minimum, and by the amount of room, if any, that was taken up by entrances, garages, gardens, and such things required by the householders and within their means in each locality. In a general way, the reasonable density of families per acre and the consequent type of development could be determined when we knew the average sum which each family could afford per month for rent or toward purchase of house and lot.² But the density of population might be produced in various ways. For instance, the population might live in row houses on small lots, but enjoy wide streets with planting strips, and frequent small parks, or they might live each family in a detached house with a considerable lot, but with narrow streets and no public open spaces.

Our figures of density of population, therefore, should be compared only after a study of the plans and tables to determine the type of development as well. In figuring these densities we took into account in all cases streets, lots, and public open spaces provided by us, but we did not take into account any public parks or playgrounds outside of our developments even though they served our residents; this, too, should be borne in mind in making comparisons. We found that it was generally possible, under our self-imposed restrictions, to house 18 families per gross acre in row houses; 9 families in semidetached houses; 5 families in detached houses. Our ordinary developments, consisting of semidetached and detached houses mixed, with no row houses, averaged 6.4 families per gross acre.

In determining the location of the whole development in relation to a community already existing, various sites will probably be available, with conflicting and diverse claims to consideration. Usually the alternative locations are of two kinds: (1) a sufficient number of vacant lots, scattered and grouped among lots already built up, or (2) a unified area of vacant land, where the designer may have a more free hand, but where almost all the work is still to be done. The choice between these two alternatives is in effect that between the advantages, economic and esthetic, coming, in the latter case, from a self-contained and unified development, and the advantages coming from detailed and immediate adaptation to existing conditions and use of existing facilities

¹ See p. 30 and Suggestions to Town Planners, p. 500.

² See Table 1, p. 310.

in so far as they can in any way be used. This decision between the "inside" and "outside" development has been the subject of published discussion, and for this the reader is referred to the bibliography appended to this report, under the section "Planning and Development" (pp. XIII-XIV).

USE OF HOUSING CORPORATION DATA.

It would be valuable to those concerned in industrial housing in the immediate future if we might have made a careful analysis of the compiled data presented herewith and recorded our conclusions in detail in the light of our experience.

It was impracticable to do this in the press of other work more directly and immediately necessary, in the time between the final collection of the data and the publication of this report. We chose rather, therefore, to present, as completely as possible within the time available, the actual results of our work, stating those factors which are the most important and arranging them so that they may be compared, both to give a clearer conception of what we actually planned and executed and to leave our results in such form that in the future the deductions for use in new design and construction may still be drawn.



CHAPTER VIII.

PROJECT DRAWINGS AND DESCRIPTIONS.

(NOTE.—Not all the Housing Corporation projects are illustrated and described in this chapter. For general data on all projects see the tables, Chap. IX.)

Aberdeen, Md.	Indianhead, Md.	Norfolk District, Va.
Alabama Nitrate District.	Dahlgren, Va. (Indianhead).	Pensacola, Fla.
Alliance, Ohio.	Kenilworth, N. J.	Perth Amboy, N. J.
Alton, Ill.	Lowell, Mass.	Philadelphia District, Pa.
Bath, Me.	Lyles (Wrigley), Tenn.	Port Penn, Del.
Bethlehem, Pa.	Mare Island Navy Yard (Vallejo), Calif.	Portsmouth, N. H. (Kittery, Me.).
Bridgeport, Conn.	Muskegon, Mich.	Puget Sound Navy Yard (Bremer- ton), Wash.
Butler, Pa.	Neville Island, Pa.	Quincy, Mass.
Charleston, S. C.	Newark District, N. J.	Rock Island District, Iowa and Ill.
Charleston, W. Va.	New Brunswick, N. J.	Seven Pines, Va.
Chester, Pa.	New London, Conn.	Sharon, Pa.
Dayton, Ohio.	New Orleans, La.	Staten Island, N. Y.
Erie, Pa.	Newport, R. I.	Washington, D. C.
Hammond, Ind.	Newport News, Va.	Waterbury, Conn.
Ilion, N. Y.	Niagara Falls, N. Y.	Watertown, N. Y.
Indianapolis, Ind.	Niles, Ohio.	

ABERDEEN, MD. (PROJECT NO. 56).

Area planned: 26.53 acres. Housing planned: Detached houses, 65 families; convertible dormitories, 60 persons.
Housing constructed: Detached houses, 65 families; row houses, 3 families; total, 68 families.

(For further information see tables, Chap. IX.)

When the United States entered the war we had to have new and extensive proving grounds for testing cannon, bombs, detonators, and other explosives, and for practice in trench warfare. The Government at once started to construct such facilities, having secured about 35,000 acres of land skirting along the Chesapeake Bay near the village of Aberdeen, Md., 30 miles northeast of Baltimore, on the main line of the Pennsylvania Railroad. While temporarily several thousand men were carried daily on trains from Baltimore to Aberdeen, great difficulty was encountered in securing and holding men because of the lack of permanent housing. The principal officials could be accommodated in houses built upon the reservation, but it was not advisable to house the civilian population there. Accordingly at the request of the Ordnance Department a housing investigation was made by the United States Housing Corporation and a site selected about 3 miles from the proving grounds, adjoining and partly in the rural village of Aberdeen.

A government-owned branch railroad carried employees free of charge from the town to the proving grounds. Village stores, a bank, and a good school

are less than a quarter of a mile from the housing site.

Aberdeen had about 600 population, and naturally very few houses were available there. The men to be housed were the skilled workmen employed on the proving grounds, well paid, and wishing to own their own homes and to have their lots large enough for a garden, according to the custom in Aberdeen.

The site selected was a tract of about 26½ acres of rolling, open cornfields, sloping from the Post Road to a small brook which runs into the bay nearby. The soil is gravelly clay, with little or no top soil and no ledge near the surface.

The Post Road is an important thoroughfare between Baltimore and Philadelphia. The county road is the main vehicular route from the village and freight yards to the proving ground. Since greater width was needed on this road, a second 18-foot pavement was added, with a 30-foot strip of grass between, which we have called Church Green. Belair Avenue, the continuation of the county road, has now a dangerous grade crossing at the railroad. It is proposed to eliminate this, leaving the road

with a dead end at the track, but with a foot passage under the tracks. The new county road would then pass across a corner of our tract, and take traffic on good lines to the proposed bridge over the railroad. The railroad was, however, unable to undertake this construction at once, owing to the pressure of all its other war activities. Two alternative locations of the bridge and approaches are shown on our plan, one cheapest to construct, the other more direct for traffic.

The road system of the development was based on these main lines of traffic, with more indirect local streets, arranged to subdivide the property conveniently and to offer good orientation for the houses and good lines and grades for the sewers. The streets of the project are paved with a gravel pavement with a bituminous binder, and concrete gutters carry the storm water at the side. The sidewalks are of cement and will be used on all streets on which houses are built.

Besides Church Green and the small triangular park at the corner of New County and Osborne Roads, there are no public open spaces. The development lies so much in the country that further provision of this sort is not now necessary and could in the future be made elsewhere.

Water supply for the housing development is furnished from the village plant at Aberdeen at the nearest point to the village and taken through the Housing Corporation's mains to the houses. Rates will be collected by the village authorities.

At the time our work commenced the village of Aberdeen had no sewerage system, so it was deemed advisable to lay out and design a system for our development that would be available also for the use of the village. On account of there being no

outlet for the sewage except in the small spring brook adjoining, the Maryland State board of health agreed with the Housing Corporation that there must be complete sewage purification before emptying any sewage into the brook. This requires a long outlet sewer and a sewage-disposal plant composed of two separating tanks with a sludge digester and a sprinkling filter plant. In order to secure a location where sufficient difference in elevation could be had to operate a sprinkling filter plant it was necessary to run a considerable distance down the creek. The disposal plant tanks are built of concrete and the sprinkling filter of crushed stone. The whole is a complete modern plant.¹

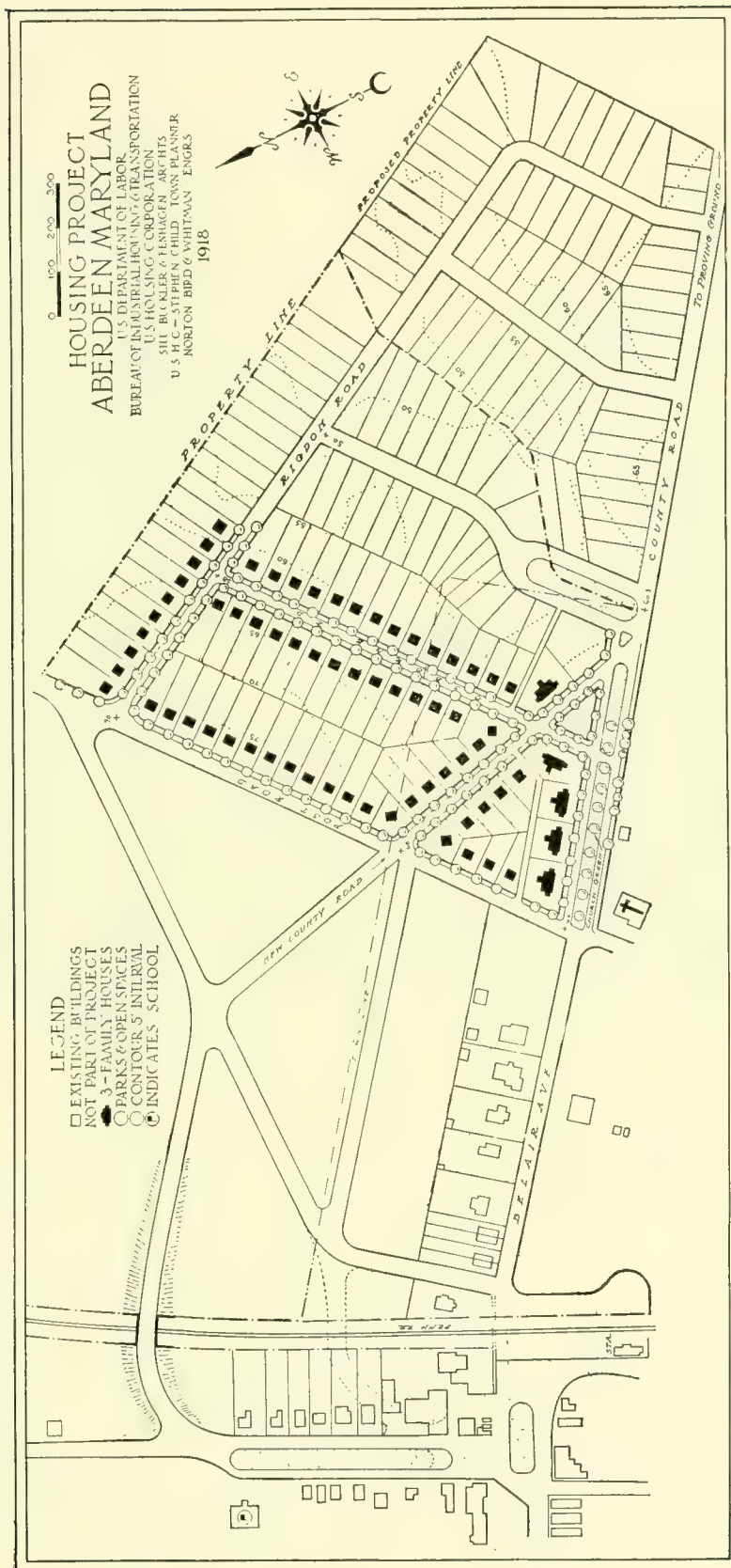
A notable characteristic of the houses at Aberdeen is that in the complete design only three types are used. The convertible houses, as illustrated, planned for development into 3 and 4 room houses, were so laid out that with the insertion of temporary partitions they made practical boarding houses. Because of the early approach of peace, two of the six groups of this type were finished up at once as four-room houses.

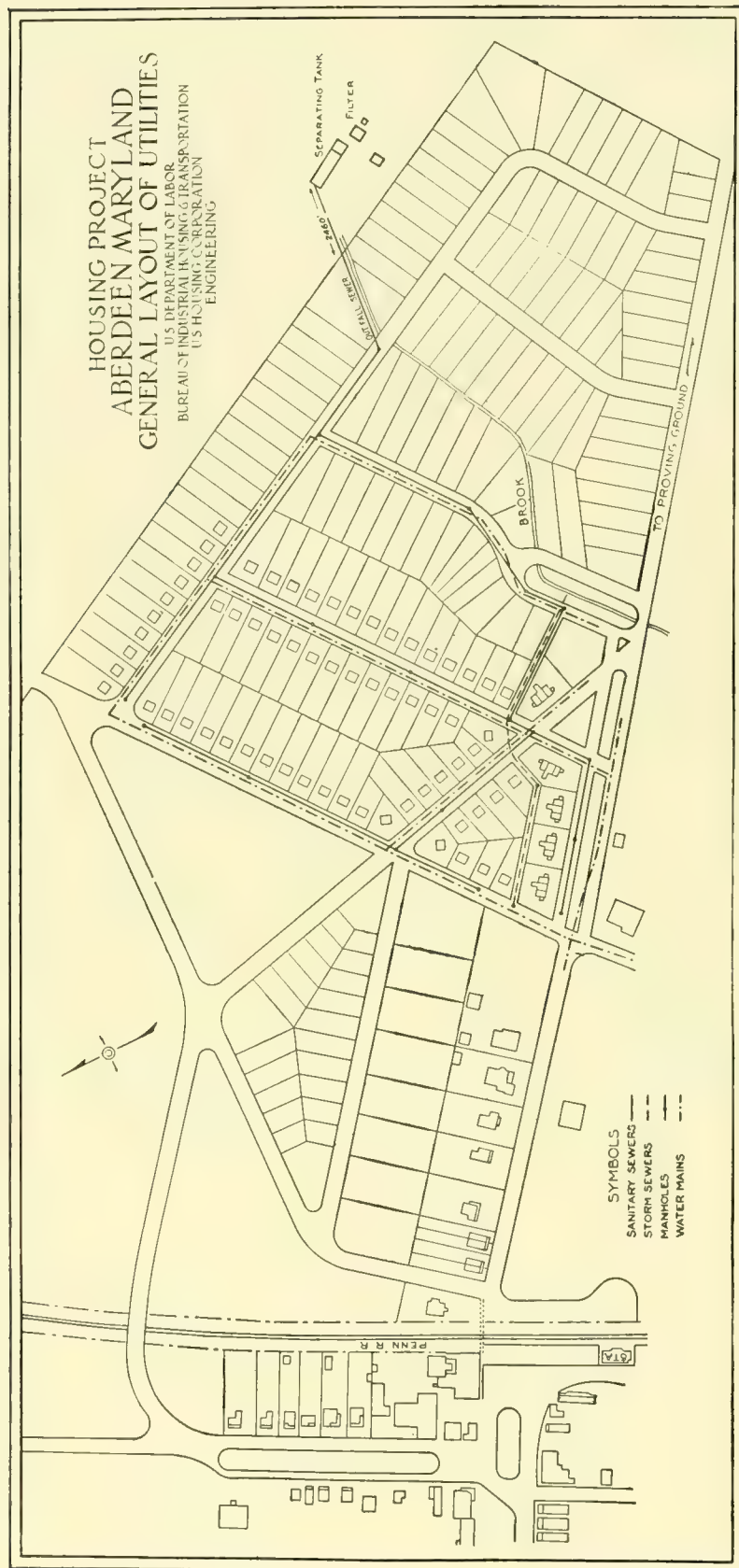
If the central structure of the three dormitory convertible buildings facing Church Green had been set back 2 feet (shallow rear lots would have prevented more) a far more agreeable arrangement would have resulted, breaking the monotony of the present straight line.

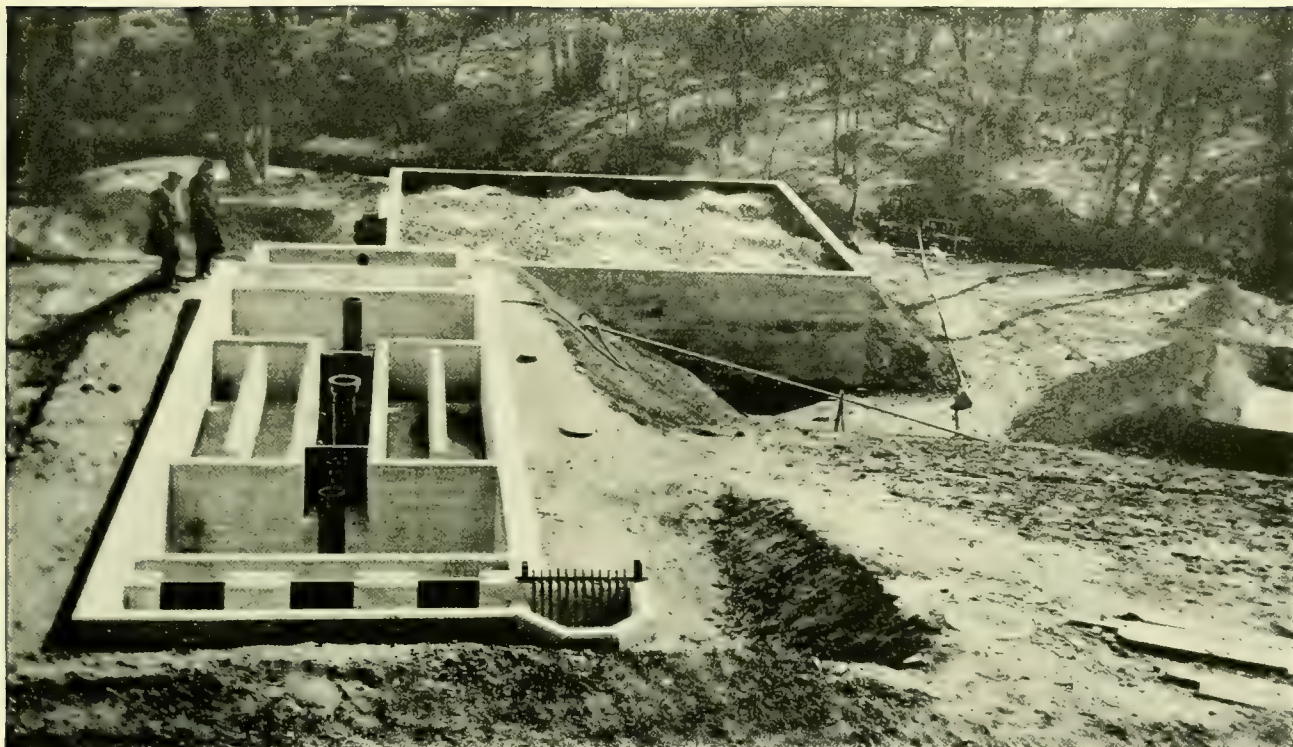
The two types of detached houses with a few variations of roof, form, and exterior material and the use of rights and lefts produce an entirely sufficient variety of appearance besides being good individually. The restrained variations in set back on the Post Road and Osborne Road are very agreeable.

¹ See photograph opp. p. 84, and plan p. 85.

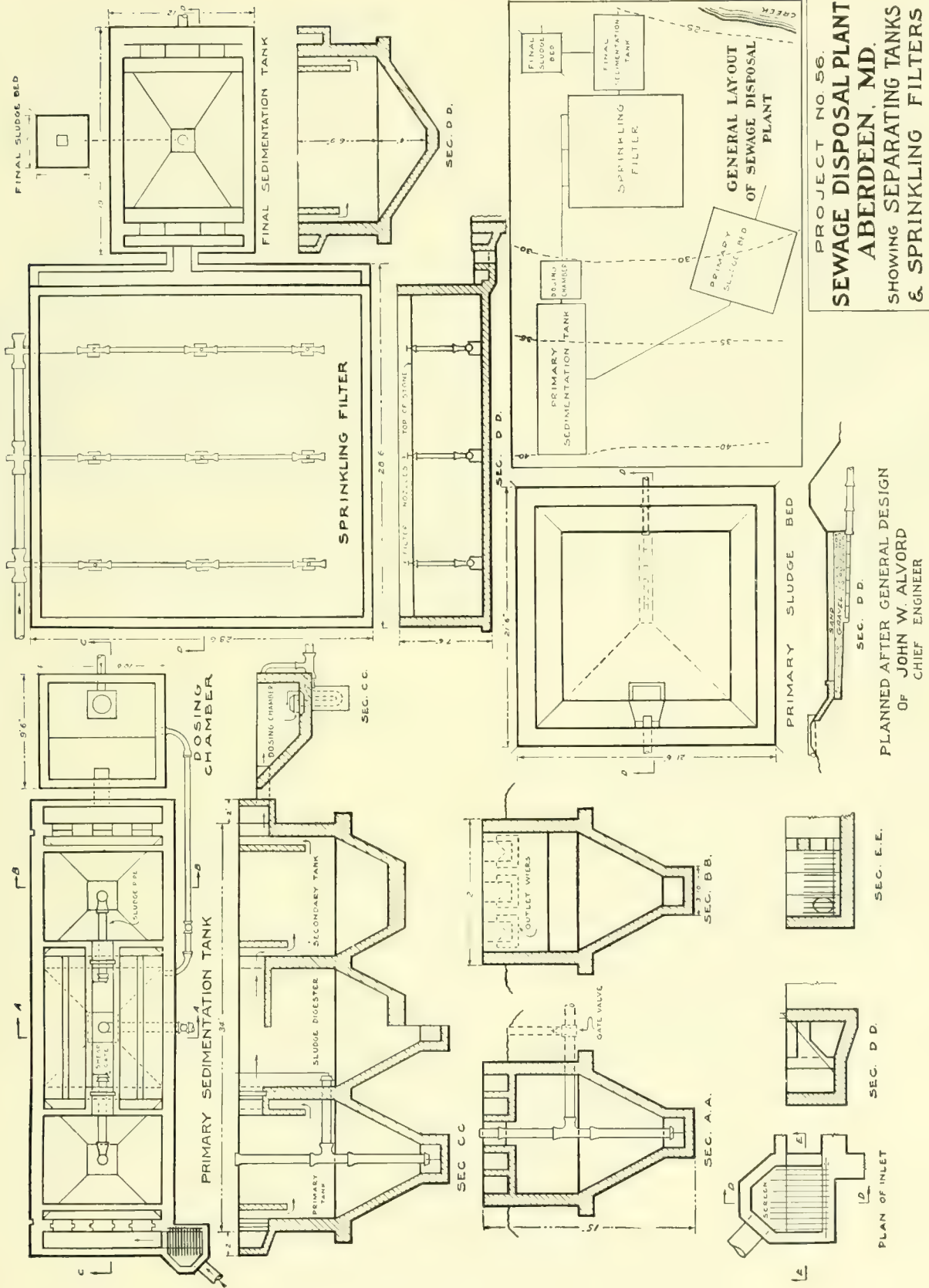


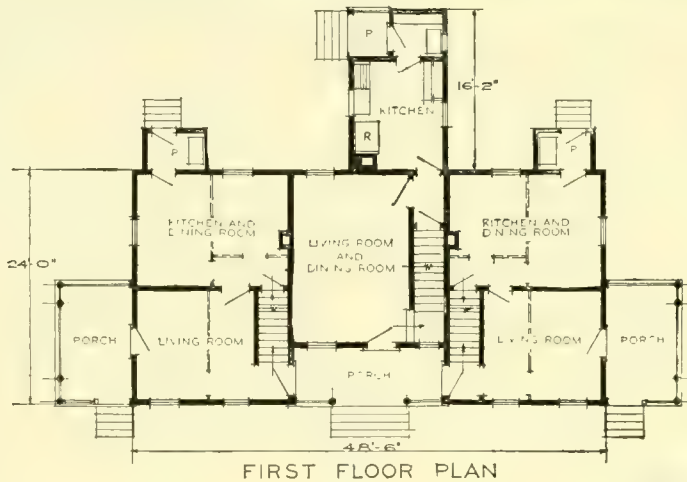
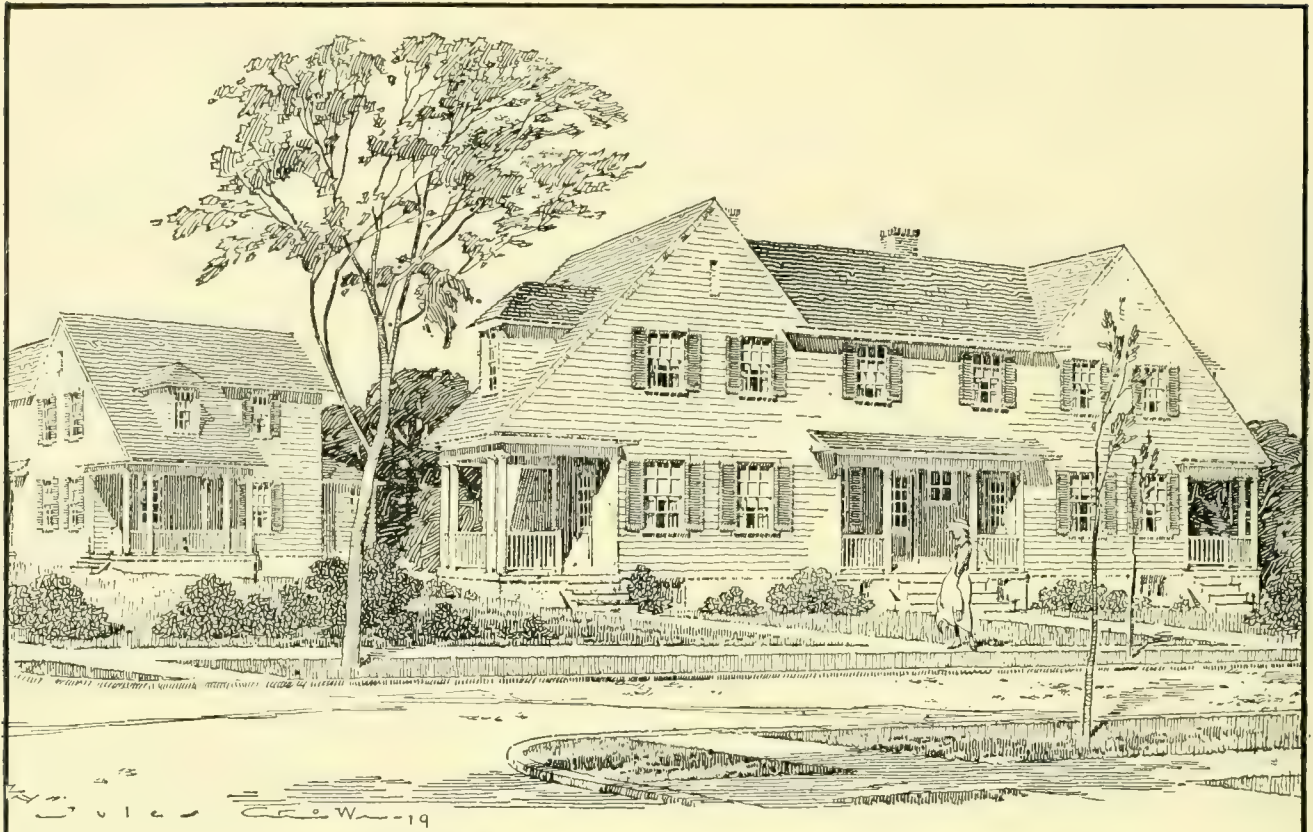




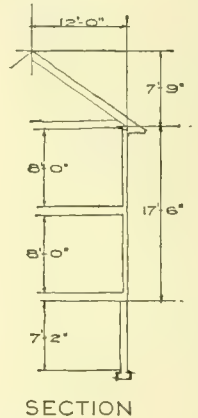


ABERDEEN, MD., SEWAGE TREATMENT PLANT



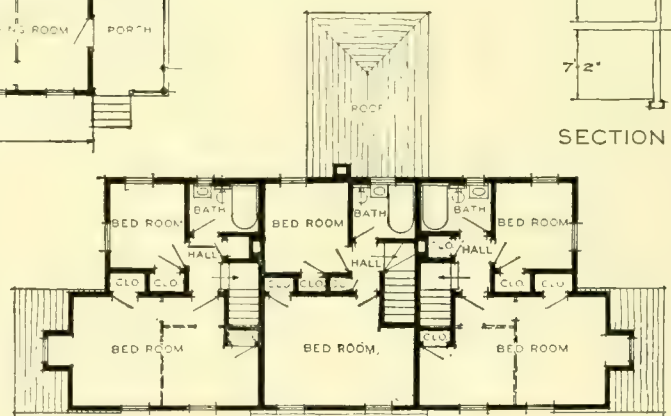


NOTE-DOTTED LINES
ON PLANS INDICATE
REMOVABLE PARTITIONS.



FOUR ROOM ROW
HOUSES CONVERTIBLE
TO BOARDING HOUSE
TYPE D

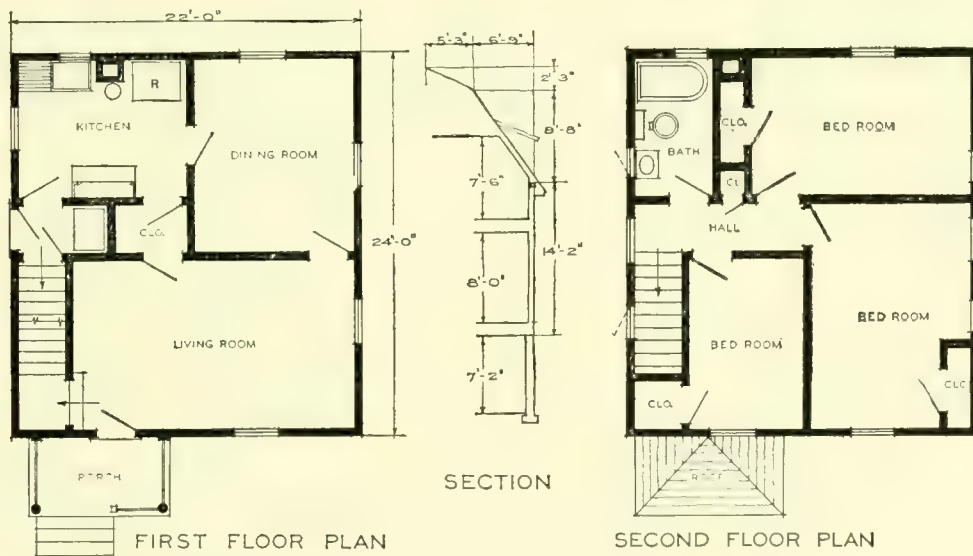
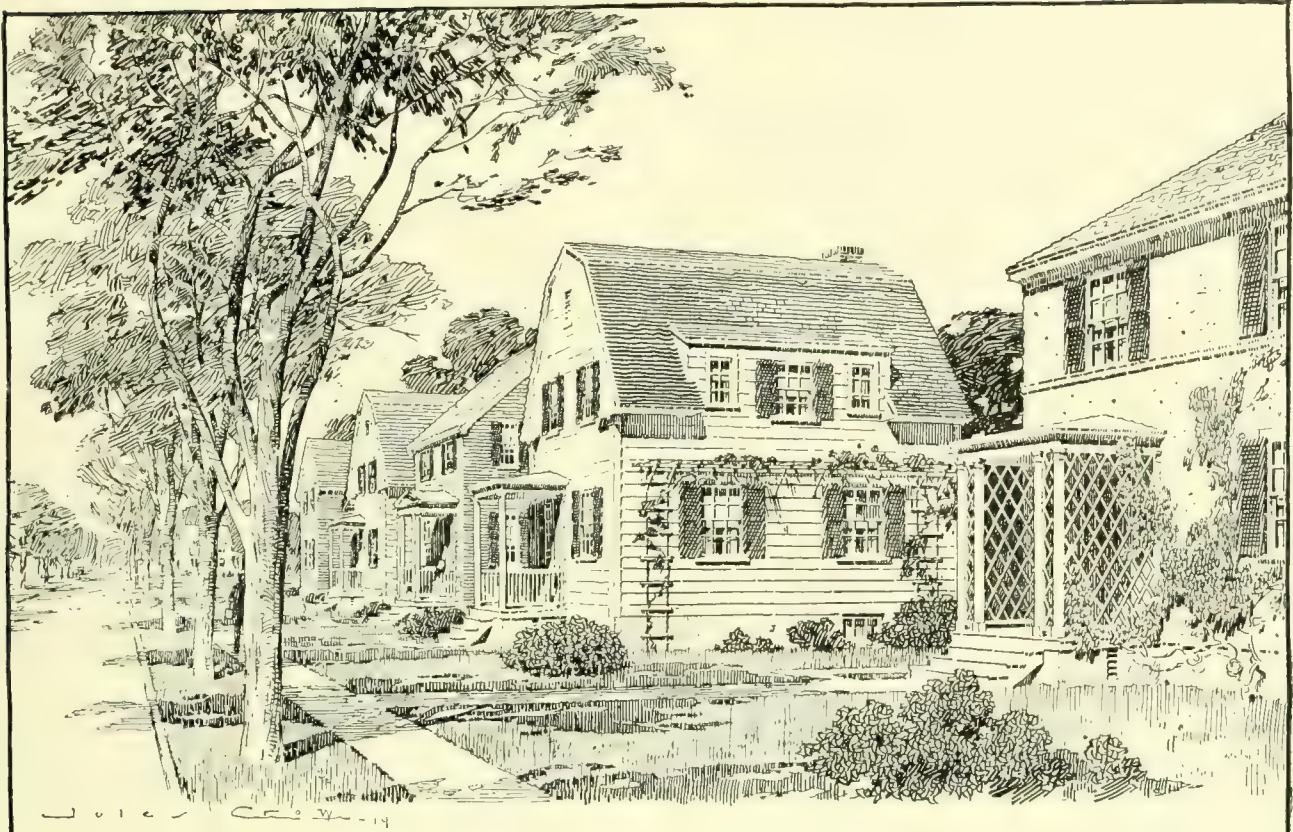
SCALE 5 10 15 20 25 FEET



UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT ABERDEEN MD

ARCHITECTS

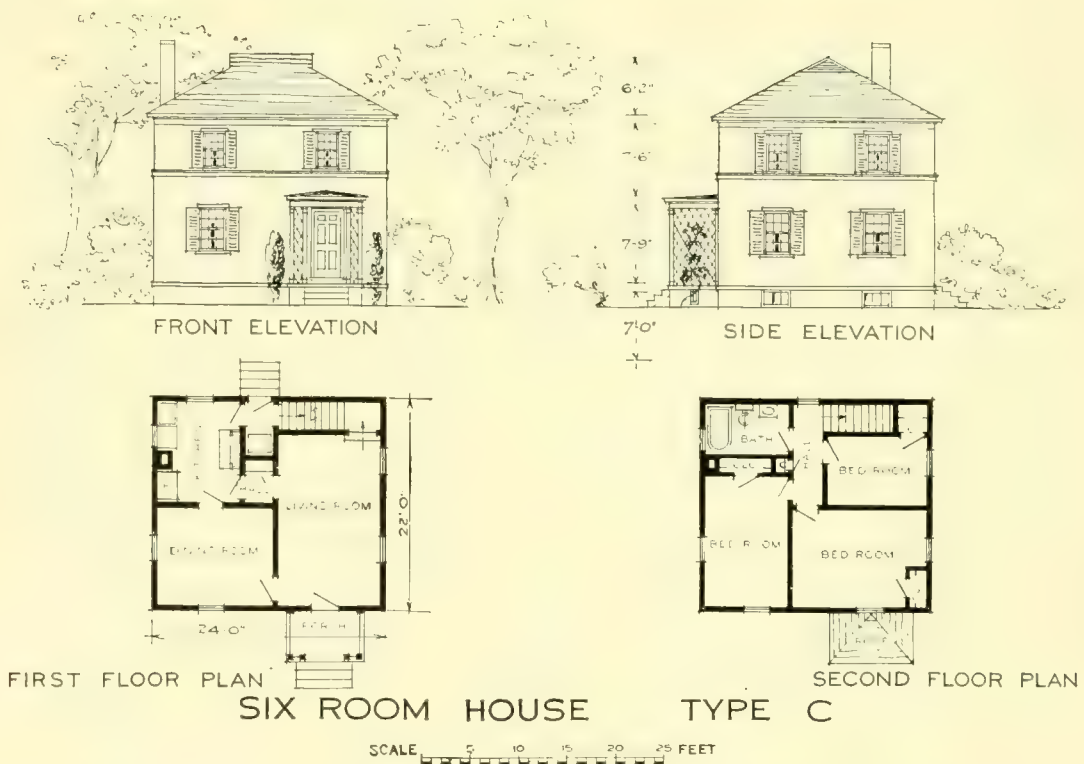
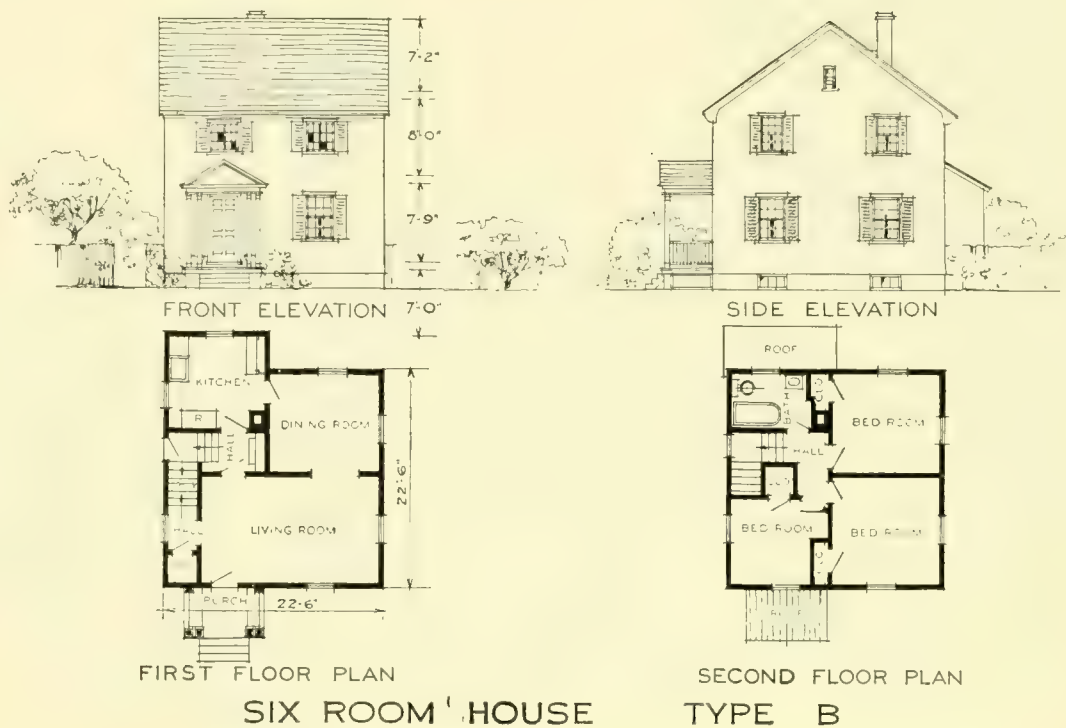
SILL BUCKLER AND FENHAGEN



SIX ROOM HOUSE TYPE E

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
 DEVELOPMENT AT ABERDEEN MD
 ARCHITECTS SILL, BUCKLER AND FENHAGEN



UNITED STATES HOUSING CORPORATION
 DEVELOPMENT AT ABERDEEN MD
 ARCHITECTS SILL BUCKLER AND FENHAGEN

ALABAMA NITRATE DISTRICT (Florence, Sheffield, and Tuscumbia, Ala., Projects Nos. 185, 597, 1165).

FLORENCE.—Area planned: 25.49 acres. Housing planned: Detached houses, 95 families; semidetached two-flat houses, 28 families; total, 123 families.
SHEFFIELD.—Area planned: 27.65 acres. Housing planned: Detached houses, 85 families; semidetached two-flat houses, 28 families; total, 113 families.
TUSCUMBIA.—Area planned: 13.78 acres. Housing planned: Detached houses, 52 families.

(Project discontinued. For further information see tables, Chap. IX.)

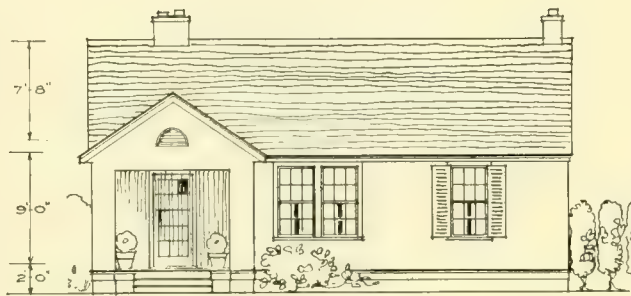
Laborers for construction work on the nitrate plants were living in cantonments, tents, stables, and garages, a condition which would be relieved to an extent when the plants went into operation, but permanent houses for the operatives remained to be furnished.

The Housing Corporation undertook an initial program of houses and apartments for the higher class employees, about equally distributed in the three towns. The custom of the locality was fol-

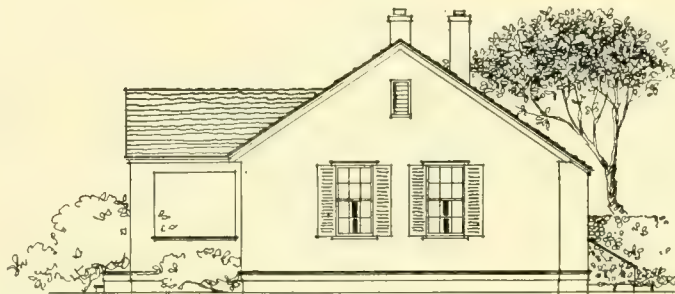
lowed in building larger rooms and porches and higher ceilings than usual. Heating plants were used only in the two-story houses and apartments, stoves and fireplaces in the bungalows, which constitute the larger part of the development.

The plans of the bungalows are simple and convenient and arranged for economical framing, and the elevation is a great relief from the usual house of this type.

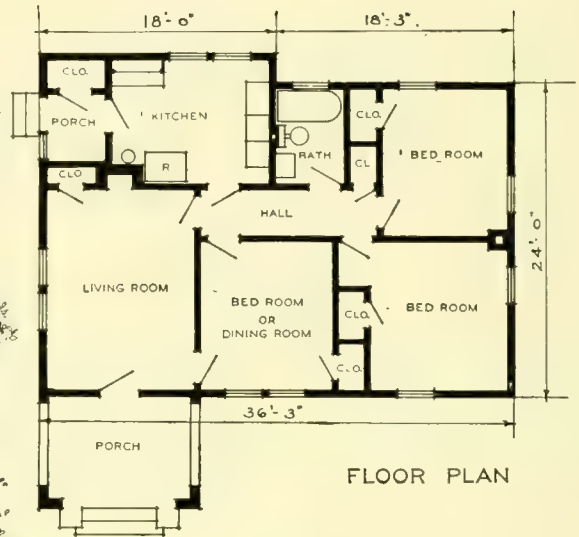




FRONT ELEVATION



SIDE ELEVATION



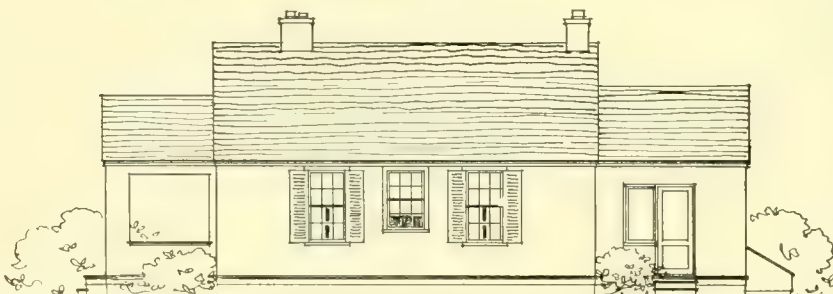
FLOOR PLAN

FIVE ROOM BUNGALOW TYPE 5A

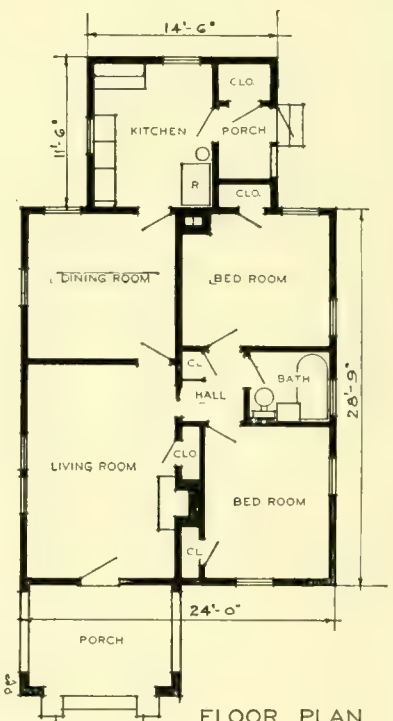
SCALE 5 10 15 20 25 FEET



FRONT ELEVATION



SIDE ELEVATION



FLOOR PLAN

FIVE ROOM BUNGALOW TYPE 5B

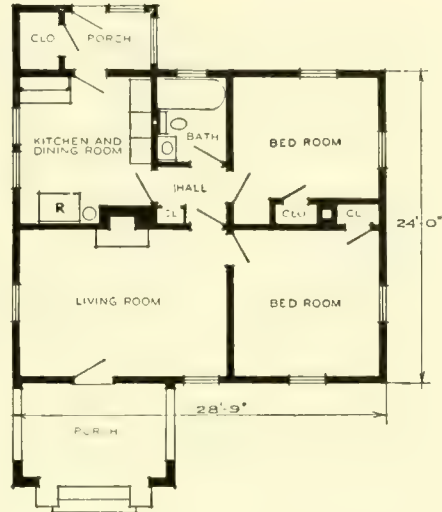
UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT FLORENCE ALA

ARCHITECTS

WARREN AND KNIGHT



SIDE ELEVATION



FLOOR PLAN

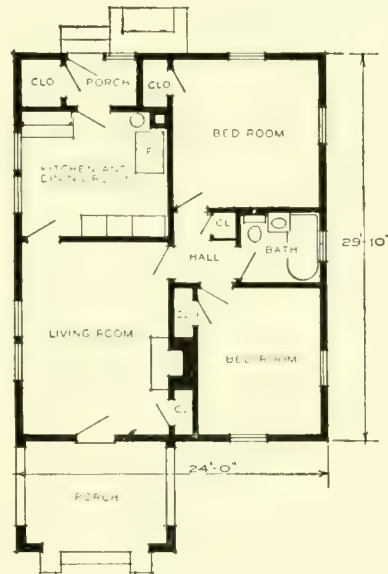
FRONT ELEVATION

FOUR ROOM BUNGALOW

TYPE 4A



SIDE ELEVATION



FLOOR PLAN



FRONT ELEVATION

FOUR ROOM BUNGALOW

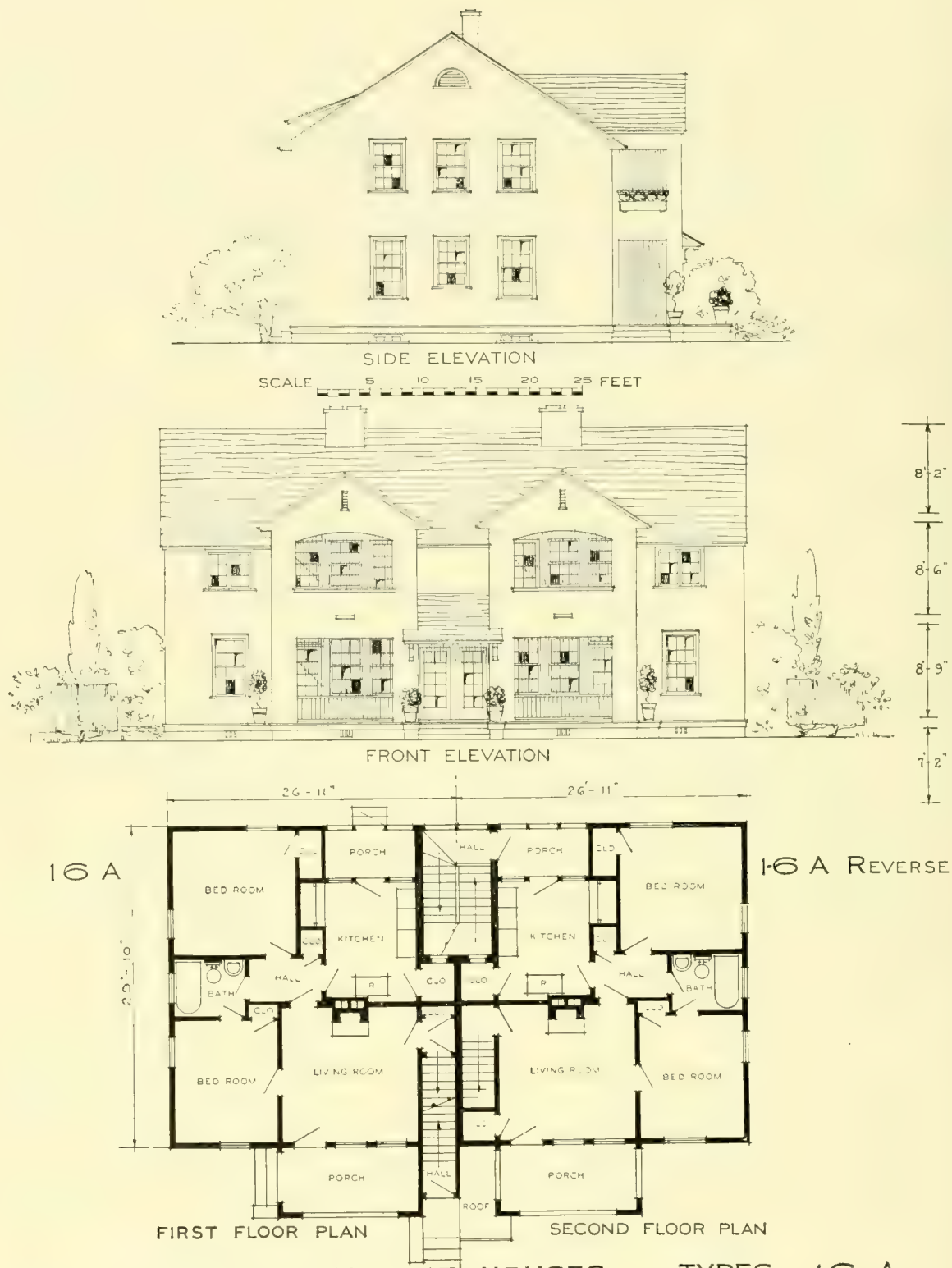
TYPE 4B

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT FLORENCE ALA

ARCHITECTS

WARREN AND KNIGHT



SEMI-DETACHED TWO FLAT HOUSES TYPES 1-6 A
 UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT FLORENCE ALA

ARCHITECTS WARREN AND KNIGHT

ALLIANCE, OHIO (PROJECT NO. 621).

NORTHWEST SITE.—Area planned: 9.29 acres. Housing planned: Detached houses, 52 families. Project discontinued.

SOUTHEAST SITE.—Area planned: 62.10 acres. Housing planned: Detached houses, 213 families. Housing constructed: Detached houses, 89 families.

(For further information see tables, Chap. IX.)

Alliance, Ohio, a rather recent railroad town within whose bounds is the old college community of Mount Union, is located in the east central part of the State. Its railroad facilities are very good, including two main lines of the Pennsylvania system and a branch of the New York Central. The entire district is developing very rapidly with new industries or expansion of existing industries. The population in 1918 was estimated at from 26,000 to 30,000, a very large proportion of the workers being skilled mechanics.

One of the principal factories was that of the Morgan Engineering Co., which was constructing a plant for the manufacture of gun carriages, limbers, transport wagons, etc. One of the largest of the existing factories was the Transue-Williams Co., which had been awarded the contract for the manufacture of motors and tractors, ordnance materials, and equipment for the Emergency Fleet Corporation. Other factories were also doing very important work for the Army and Navy.

As the principal industries were in two groups east and west of the built-up center, two housing sites were chosen, the larger serving the principal war industries, being southeast and comprising 62.10 acres of high, level, undeveloped land closely adjoining the limits of the built-up city. Other tracts were more remote, or less desirable owing to the disagreeable surroundings.

The most suitable tract near the western industries was found to be a partially developed, platted area where a sufficient number of lots could be obtained in a block. This tract, though somewhat separated from the built-up section, was easily accessible, and its even topography facilitated construction. On this northwest site no changes of street plan were made, but certain groups of eight lots as originally platted were divided into nine, as the lesser width was sufficient for the type of housing used. On this site are no special facilities,

the number of houses being insufficient to warrant any such provision.

On the southeast site, part of the tract had been previously laid out on a rectangular system which we modified to produce lots somewhat shallower than those in the original plat. In the northern part of this site the only attempt at irregularity in the whole plat was the introduction of Grace Street, which turns at right angles and produces a secluded group of dwellings. This arrangement adds a certain interest to the neighborhood but the arrangement of houses around the bend is not entirely satisfactory. They would have looked better and probably had a higher value if they had not been set back so far and if the side spaces between them had been less than elsewhere instead of more. The arrangement of Grace Street gives one less lot than if it had carried through to Liberty Avenue and it may fairly be questioned whether the picturesque possibilities of the elbow street are sufficiently well realized to justify this loss. The four houses which form the vista points of the two parts of Grace Street just miss coinciding in the axes of the street, an unfortunate result of adhering almost rigidly to a uniform lot width and to the exact alignment of lot lines. Another unfortunate result of this practice is the production of transverse lanes or accidental vistas between buildings extending across several blocks. Near-by is the only store center. Some stores are very desirable, since the nearest stores of any size are at the business center of the town, about a mile and a half away. The set-back grouping of houses on Wade Avenue is pleasant, although here as elsewhere a slighter set-back would have accomplished the result better. The entire south end of the tract, which was found to be obtainable as a part of a property purchase without much extra cost, is suitable for park purposes only, being for the most part low and all below the level of the sewer system. This would, under ordinary con-

ditions, be an unduly large area to allocate for park purposes, but in view of its low cost and the fact that it faces a public school site and that there are no other parks whatsoever in the city of Alliance, it is a very desirable feature of the plan. The city is cooperating in making a park of it.

The principal approach to the business center of Alliance is by Liberty Avenue along the west side of the tract, but the principal approach to the works is by Morgan Avenue, which intersects the tract from south to north. The possibility for future car service for this section of the city was considered and it was decided that Liberty Avenue, along the north end of which a car line now runs for a short distance, would not be the best location as it is only one-half mile from the present car line to the southern part of the city. Morgan Avenue was selected as most desirable for a future car line, because it was more central to the future population not within reach of the existing car line, and was therefore made of extra width between property lines.

In the vicinity of the site the existing houses are nearly all two full stories, of wood or brick and wood, with cellars and all modern conveniences, and would cost from \$3,500 to \$4,000. Public schools are from one-quarter to one-half mile from the site, but the city owns land for a new school opposite the south end of the tract.

On the signing of the armistice the northwest site development was at once canceled. Shortly after, 40 houses of the 129 contracted for on the southeast

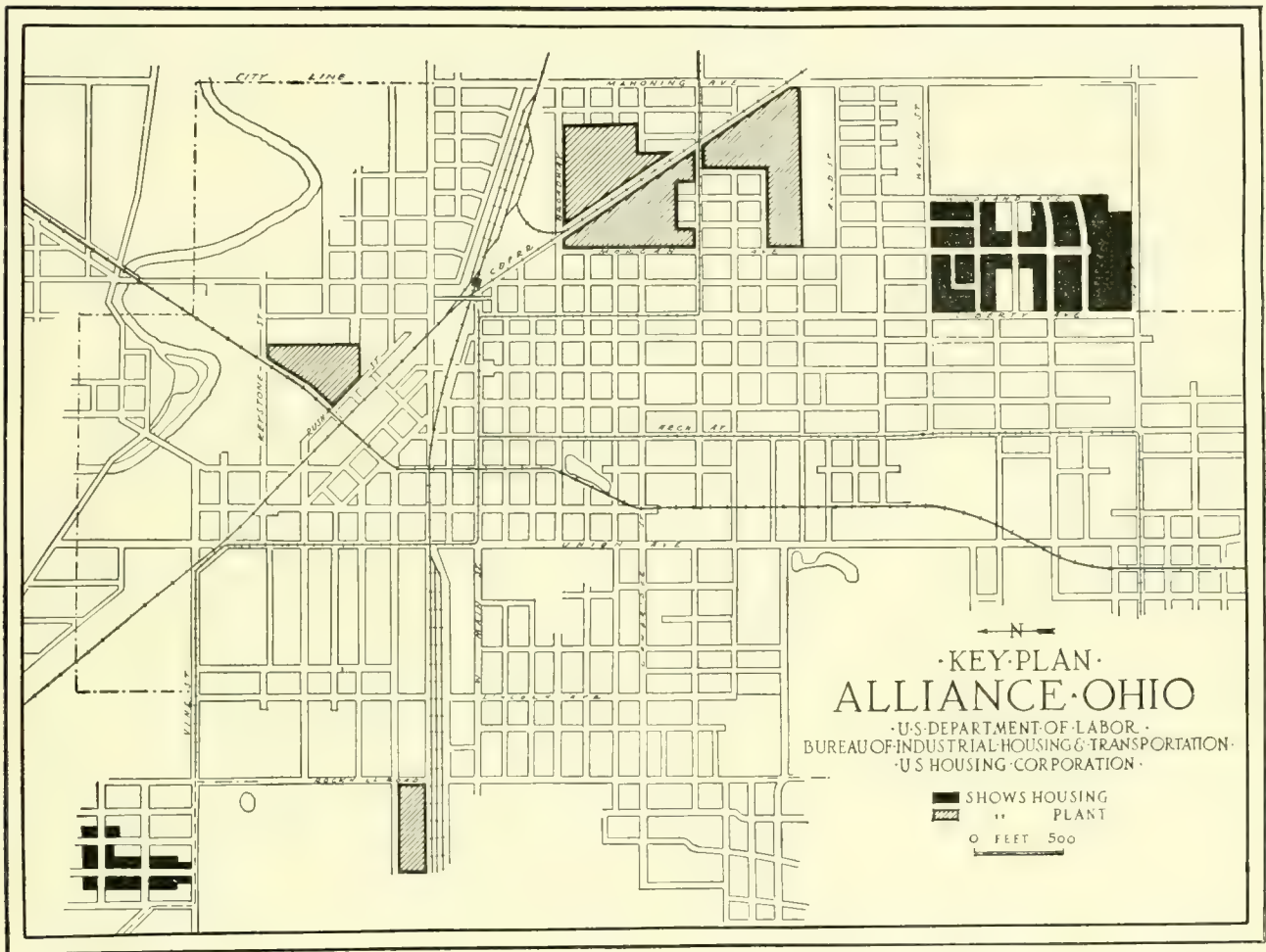
site were canceled, together with the sidewalks and utilities serving them. The other 89 houses are being completed.

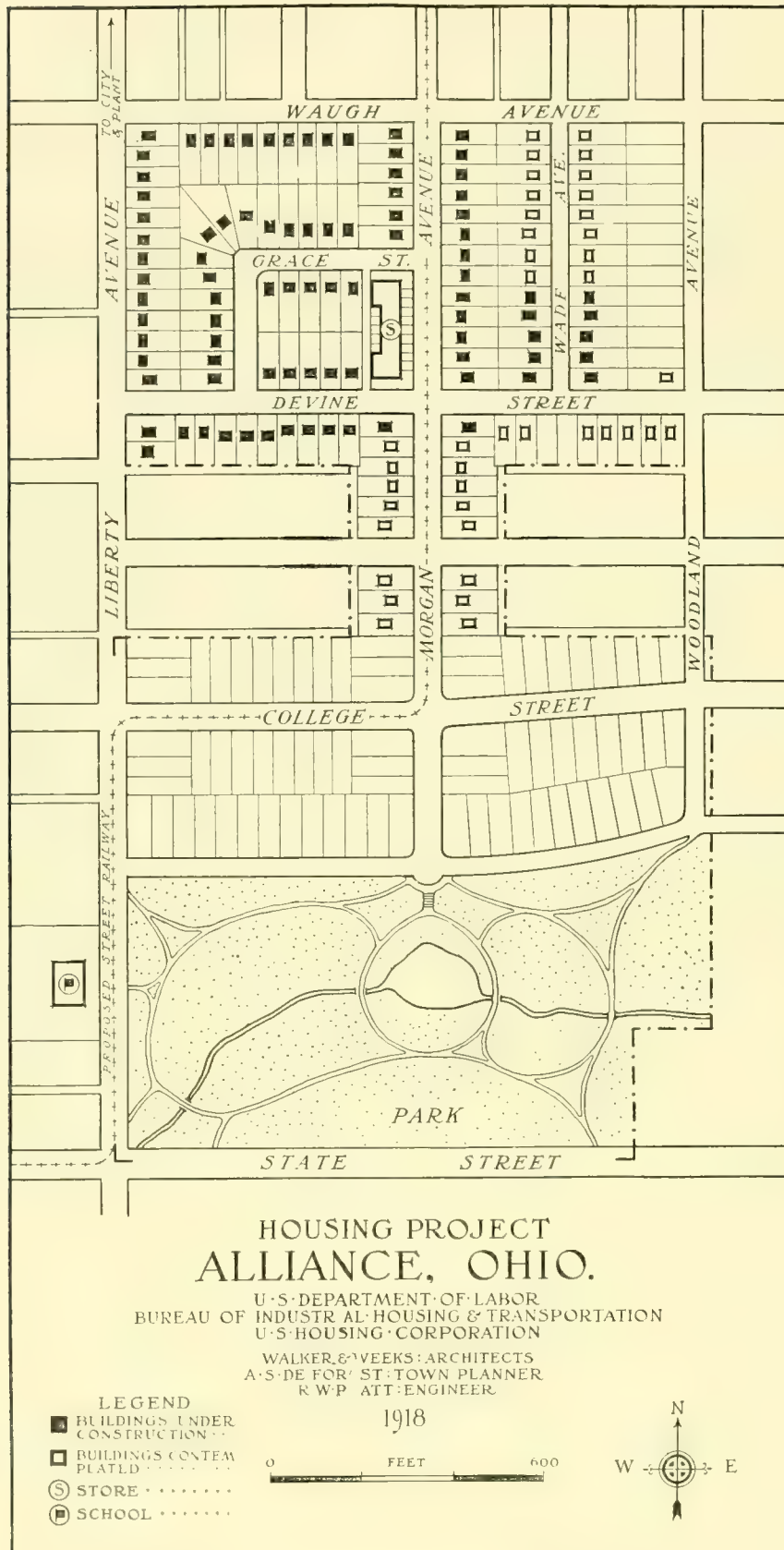
Individually the houses are good, fulfilling admirably all that is required of them. The plans are all well worked out from the corporation standards, the only difference being slight variations in size, for the purpose either of adding a room or varying the exteriors, of which there are six different sorts. Some of the houses are of brick while others are shingle or clapboards.

But even with this number of varieties of design and material there is a monotony of appearance, which is due entirely to the repetition of the several kinds of houses in rows, each house exactly like its next-door neighbor in design as well as in color. The brick houses are in one row; the shingle houses in another; the clapboard houses in still another, the color of the last mentioned being either so dark as to be somber or entirely too yellow to be agreeable. Had a more delicate color scheme been used, as at Cradock or Watertown, the clapboarded houses themselves might have aided in lifting the development out of its somewhat institutional aspect.

The use in some of the houses of this project of a special hollow-face brick much larger in size than is usual should be noted. This brick is very good in color, and as it is capable of being laid quickly it is well worthy of being considered for rapid construction.







ALTON, ILL. (PROJECT NO. 554.)

BROADWAY SITE.—Area planned: 6.62 acres. Housing planned: 273 single workers in convertible dormitories.

EAST ALTON SITE.—Area planned: 2.61 acres. Housing planned: 15 families in detached houses.

MILTON HILL SITE.—Area planned: 36.67 acres. Housing planned: Detached houses, 17 families; semidetached houses, 82 families; row houses, 86 families; apartment houses, 15 families; total 200 families; 485 single workers in convertible dormitories.

(Project discontinued. For further information, see tables, Chap. IX.)

The city of Alton is in the southern part of Illinois on the Mississippi, at the apex of the alluvial plain where the high land touches the river bank. In the town the industries are generally located on the plain, the residences on the higher and more healthful land. The population of the city is about 30,000. The chief industry needing housing help was the Western Cartridge Co. in the eastern part of Alton, employing about 3,000 and expecting to employ 4,500, all on war work. The people especially needing housing were women workers and skilled men with families. There were three developments proposed in Alton by the Housing Corporation: a block of convertible dormitories for about 300 girls on Broadway, a block of foremen's houses at East Alton, and the Milton Hill site, here illustrated.

This last site is 2 miles from town and on the most conveniently located high land in the vicinity of the Western Cartridge Co. Any development nearer the cartridge works would be on low ground and in an undesirable neighborhood without recreation facilities. The tract chosen was bounded on the east by the Chicago & Alton Railroad tracks. Train service via the Chicago & Alton and street car service via Milton Road were proposed to connect it with the cartridge works and with the town of Alton. The land was mostly undeveloped, though some of it had been sold in single lots.

Milton Road is the only through road serving the site. Going southeast and then northeast along it for about a mile one comes to the works of the Western Cartridge Co. Turning to the west from it, either north or south of the project, one finds a road leading to the center of Alton, over a mile away. A footbridge was proposed over the tracks of the Chicago & Alton Railroad, the traffic to go thence either over the Chicago, Burlington & Quincy tracks also and so to the cartridge company by an indirect way, or directly along the right of way of the Chicago, Burlington & Quincy if this could be arranged.

The proposed road system of the development fitted the ground most readily by running east and west parallel with the length of the high flat area in the center of the site, and converged for traffic convenience at the nearest angle of Milton Road, which lay at the western end of this high ground.

This point being the natural traffic center was treated as a plaza and site for stores and public buildings. In cutting up the land between the six radial streets into reasonable blocks, two streets were produced running around the plaza as parts of concentric irregular octagons. The broken vistas and the traffic lines thus brought about are good. The incomplete formality of the layout, whether good or bad, is apparent only on plan. A flaw in the design which perhaps might have been eliminated if the plan had gone beyond the preliminary stage, is the awkward connection from the plaza to the road running westward across the low-lying park. This road could not leave the plaza exactly on the western side both on account of the grades and because the waiting room was best located in this place. Another doubtful point, which could easily have been changed if it seemed desirable on further study, is the continuation of the radial axis toward the northeast from the plaza by a path across the broken ground terminating in the house group overlooking the Chicago & Alton Railroad.

The irregular ground, sloping to the north and to the south from the main upland, is developed as economically as possible, with larger lots, only those houses most easily put on the ground being shown on the plan. The irregular ground to the west of the plaza is a park, and the waiting room between them overlooks them both. The main open tree-planted mall connecting the plaza with the athletic field is the backbone of the scheme and would be a good promenade, but hurried foot traffic to and from the footbridge over the railroad would mostly be confined to the parallel roads north and south of the mall.

The buildings proposed at Milton Hill comprised, besides detached and semidetached houses, 21 dormitories, each convertible into four six-room houses, a building containing a fire-engine house, a waiting room and public comfort station, stores with apartments over them, and a recreation building or community house, with reading rooms, meeting rooms, and a large auditorium.

A cheap and simple form of wood frame construction was proposed, and a design of a more or less English character, permitting freedom in its handling to insure large window openings. For the exterior, stucco and patent sheathing to obviate the necessity of board sheathing was used. Casement windows were adopted to conform with the design and because weighted sliding windows would require metal essential to important war industries.

A characteristic of the layout was the placing at street corners of houses designed with the main wall at 45° and the ends following the street lines. This arrangement makes the street-intersection area more ample, and faces good house-fronts upon it. In the store-apartment buildings a clever

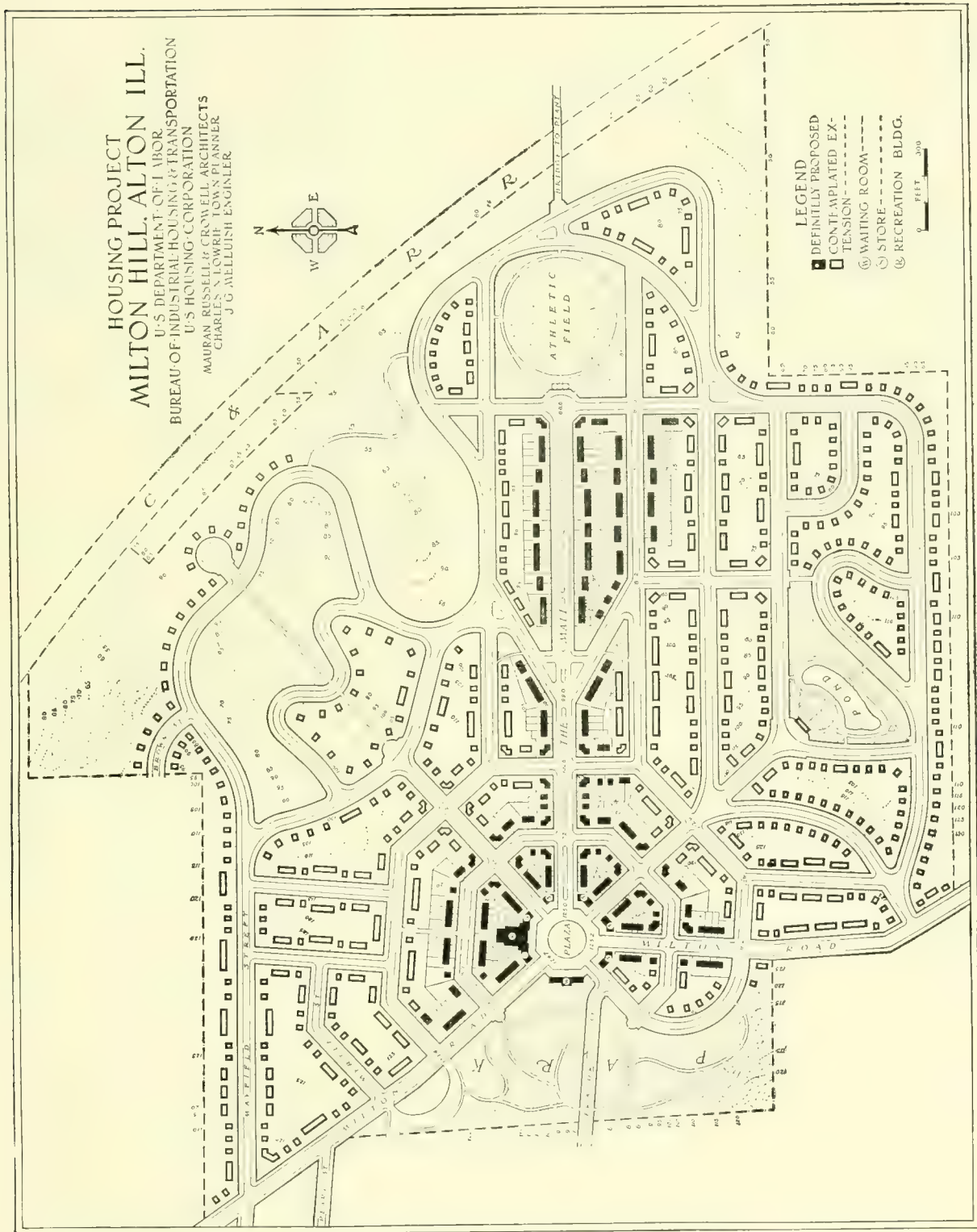
arrangement of stairs to the second floor permits of access to the apartment from the store, or from the street by a possible tenant not connected with the store.

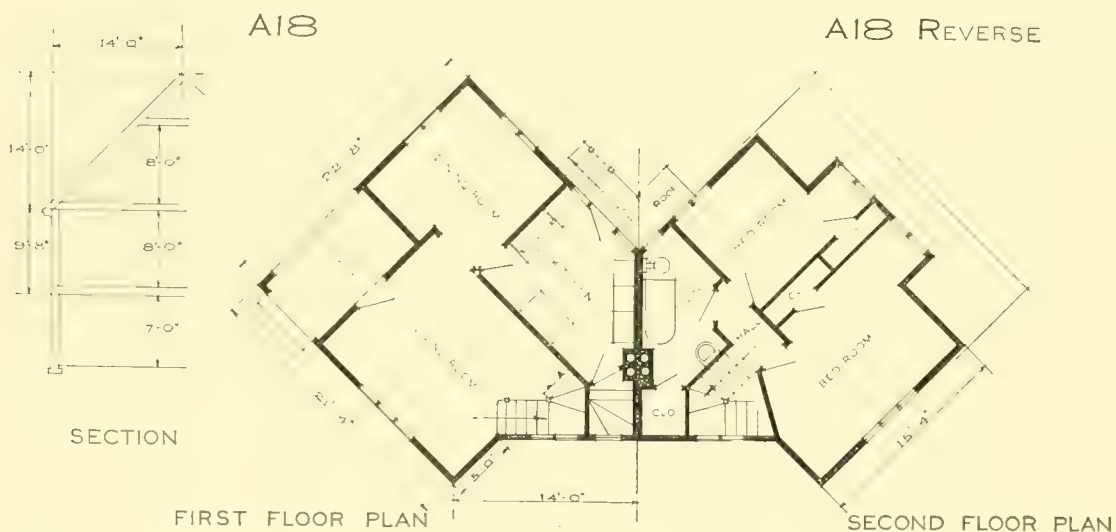
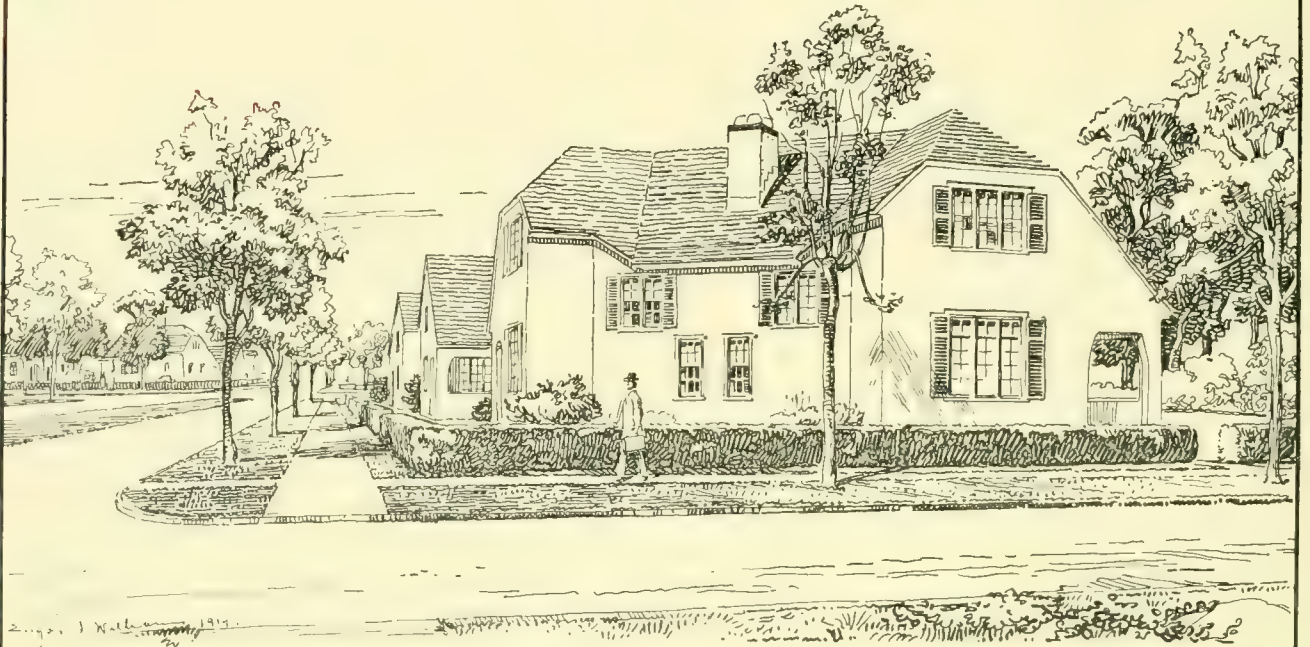
At the Broadway site 21 convertible houses were proposed, to be used first as dormitories or boarding houses during the period when single women or men workers are numerous, but they could have been transformed into family dwellings simply by the closing of a door in the party wall and the installation of necessary kitchen fixtures.

No arrangement other than a straightforward, efficient, and economical placing of the houses in a row was attempted on the Broadway site, as the land called for this disposition on account of its size and shape.

At East Alton the group of 15 houses proposed were of the same types as at Milton Hill, laid out along a straight street, but varied in setback for added interest in appearance. The row houses are planned with service entries from the front, in addition to the main entrances, thus eliminating the necessity for alleys.





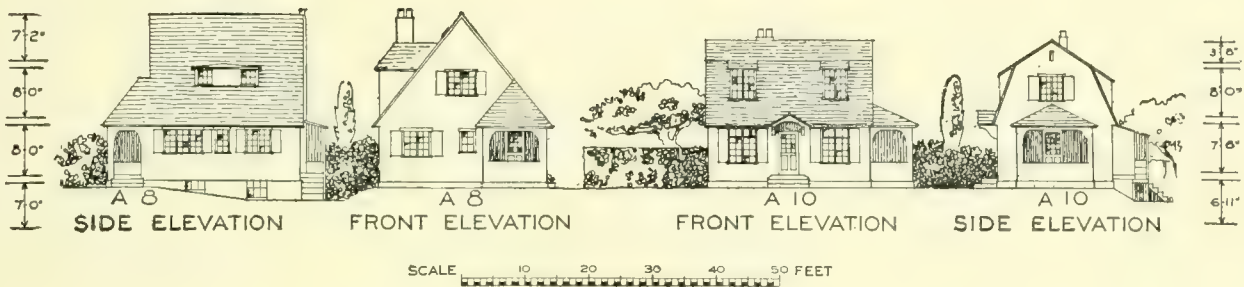


SEMI-DETACHED SIX ROOM HOUSES TYPES A18 AND A18 R

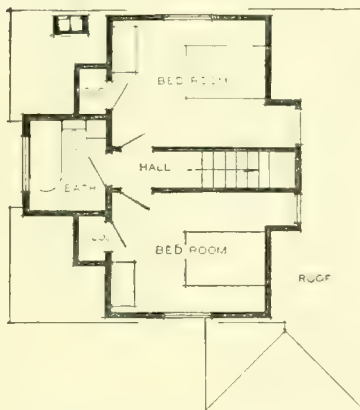
SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT ALTON ILL

ARCHITECTS MAURAN RUSSELL AND CROWELL

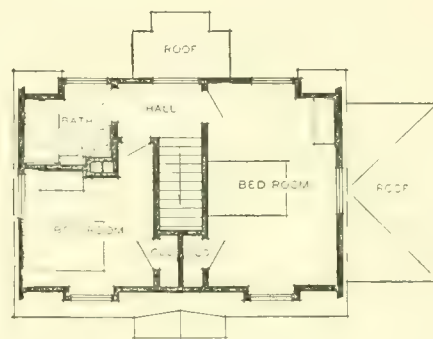


A 8

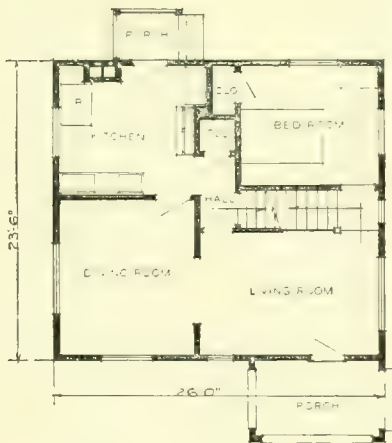


SECOND FLOOR PLAN

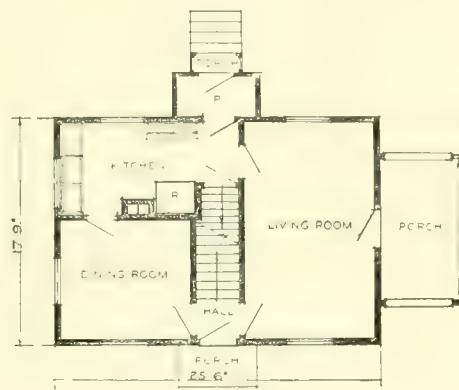
A 10



SECOND FLOOR PLAN



FIRST FLOOR PLAN



FIRST FLOOR PLAN

FIVE AND SIX ROOM HOUSES

TYPES A 8 AND A 10

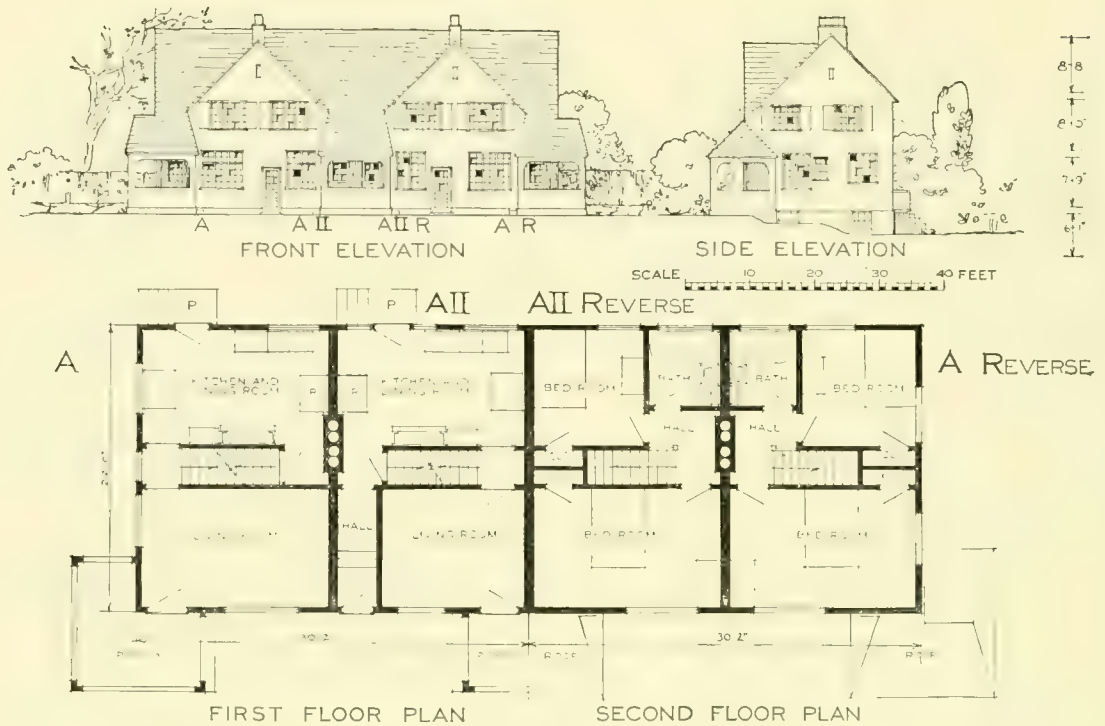
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UNITED STATES HOUSING CORPORATION

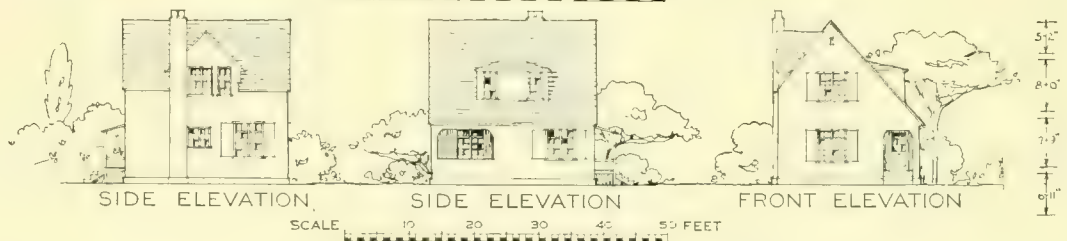
PROPOSED DEVELOPMENT AT ALTON ILL

ARCHITECTS

MAURAN RUSSELL AND CROWELL

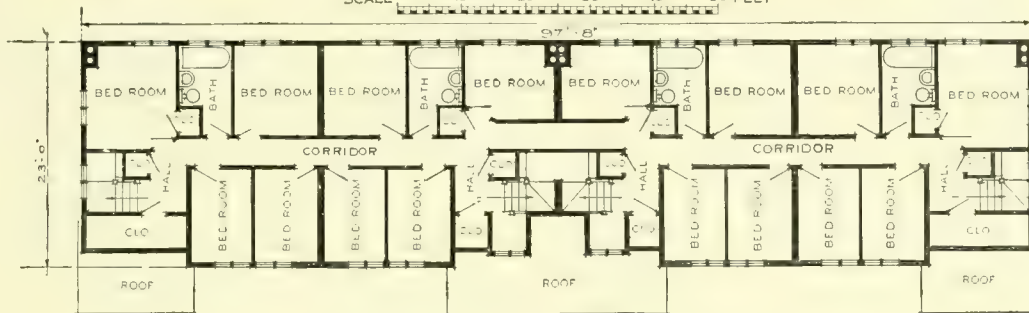
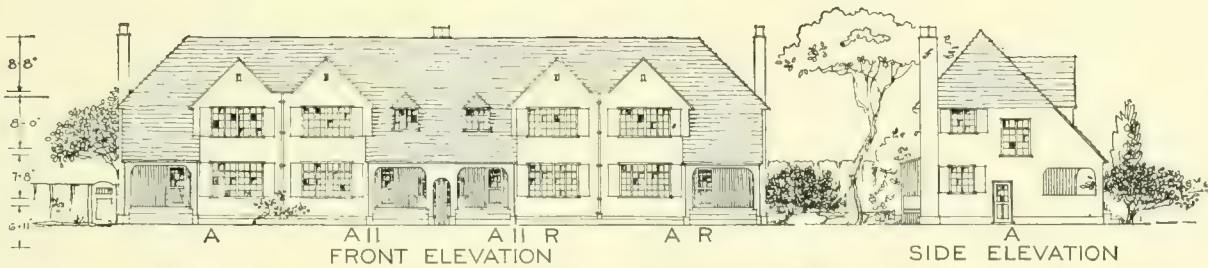


FOUR ROOM ROW HOUSES GROUP 4-4 TYPES A AND AII

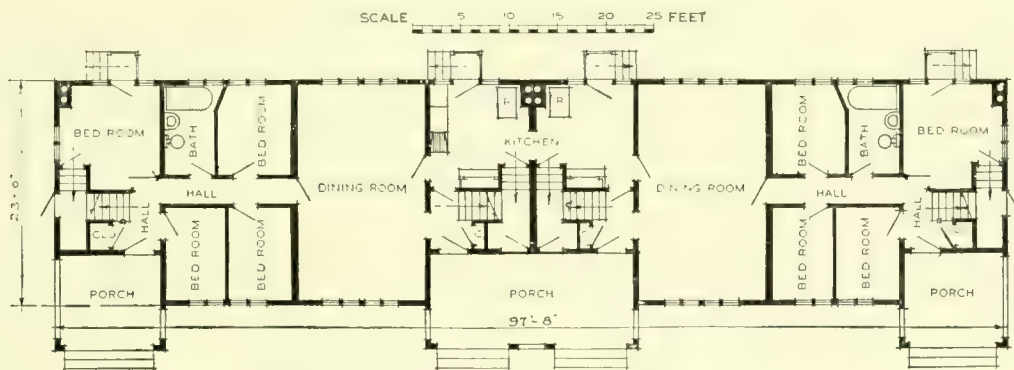


FIVE ROOM HOUSE TYPE 1-5

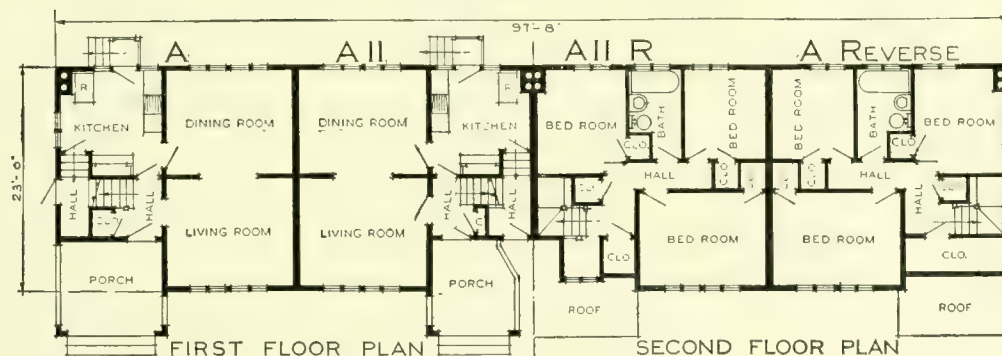
UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT ALTON ILL
 ARCHITECTS MAURAN RUSSELL AND CROWELL



SECOND FLOOR PLAN CONVERTED



FIRST FLOOR PLAN CONVERTED



SIX ROOM ROW HOUSES GROUP 46A TYPES A AND A II
 CONVERTIBLE TO BOARDING HOUSE

UNITED STATES HOUSING CORPORATION

PROPOSED DEVELOPMENT AT ALTON ILL

ARCHITECTS

MAURAN RUSSELL AND CROWELL

BATH, ME. (PROJECT NO. 59).

Area planned: 9.14 acres. Housing planned and constructed: Detached houses, 74 families; semidetached two-flat houses, 16 families; total, 90 families.

(For further information see tables, Chap. IX.)

Bath, Me., is an old shipbuilding city located on the western bank of the Kennebec River, about 10 miles above its mouth. It has a population normally of about 10,000, but during the war period this was increased to approximately 14,000. It is a long and narrow town, stretching 3 miles north and south along the river and extending inland only about a quarter of a mile, except at the center where it is about half a mile wide. Three or four streets run lengthwise, connected by numerous short, irregular, east-and-west cross streets. The western edge of the town is about 80 feet above high tide. Thence the ground slopes easterly to a narrow plain along the river. On this plain the shipyards are located.

From 1900 to 1916 shipbuilding, the chief industry, declined and nearly disappeared, but the city continued to be the center of a considerable freight and passenger traffic. During these years the population decreased from 10,447 to 9,396.

In 1917-18 the Shipping Board placed contracts with the Texas Steamship Co. for steel oil tankers, and with several other firms for wooden ships and for steering apparatus and such accessories. The Navy Department placed contracts with the Bath Iron Works for torpedo-boat destroyers.

The Housing Corporation project here was for employees of the Bath Iron Works. The Emergency Fleet Corporation had already begun the construction of housing for the workers in the other plants concerned. While plans were under way for new houses steps were taken also, as in every town where the Housing Corporation planned housing, to utilize existing accommodations to their fullest extent, and to prevent exorbitant rent charges. The local organizations of the Homes Registration Service and the rent-profiteering committee were extremely active and successful. In one case the annual rental of a house was found to be 100 per cent of the entire value of the estate. This house was commandeered by the Secretary of the Navy, and its rental set at a reasonable figure, with a most wholesome effect on rent profiteers in the city.

The site chosen, the so-called Palmer tract, is in the west-central part of the town and within about three-quarters of a mile of the Bath Iron Works, via Lincoln Street, nearer than any other equally available site. Traffic between the site and the plant passes conveniently through the store center of the town. The spreading of the town sideways away from the river, encouraged by this development, is an advantage, as the town is tending to become inconveniently long and narrow. The site includes about 24 acres, the western third of which is ledgy and wooded. The ground of the rest of the site is heavy clay requiring sewers, as cesspools would not be practicable. Underlying rock in various places on the site made sewer work expensive.

The boundaries of the land, with the existence of Academy Street on the south boundary and Lincoln Street, the main approach, on the east, practically dictated two new streets parallel with Academy and leading off Lincoln, giving five rows of lots.

The lots between Cobb Road and Academy Street are made shallower than the others (80 feet) in order to keep Cobb Road further off the summit of the hill occupied by the old Palmer house with its high colonial portico. This house was retained for use as a community building or as an apartment house and an open green was laid out on its axis leading in from the high point on Academy Street. This was called Flaherty Park in memory of the first Bath boy to lose his life in the war. Facing on this green are four pairs of semidetached two-flat houses, larger and more interesting in architectural appearance than the other houses. The other buildings are all detached single family houses in accordance with the custom of that part of New England and are placed on lots normally ranging from 40 by 80 feet to 47 by 100 feet, with side spaces between houses of 16 to 30 feet or more.

West of the Palmer house three tiers of lots "line up" exactly so as to form straight narrow lanes of sight between the houses extending from Cobb Road

to the north boundary along the lot lines, an unpleasant feature to which wholesale building operations with much repetition of standard sizes of house are peculiarly subject, but which is avoided elsewhere in this project by the "staggering" of the lot lines.

Dike Road occupies a transverse valley draining the westerly part of the land to a combined sewer, constructed across private property to the south.

The length of the straight east and west streets is not noticeable in fact because each is in appearance divided into two units by the high points in their profiles.

This division of the streets into separate units is well recognized in the placing of the houses by systematic variations in setback, except in the case of Andrews Road. In that case, partly because of changes in grade made for economy during the progress of the work, the recessed portion of the building line, eight houses in length, is awkwardly related to the street profile, the summit of which is markedly off center with the house grouping. As a refinement of design the slight concave curve in the recessed portion of a building line, certainly when as long as on Andrews Road, is in itself pleasant. But a comparison of Cobb Road with Andrews Road emphasizes the principle that as a summit in the profile is a natural division between successive parts of a street, a unit of grouping, such as a recession in the building line, terminated at each end by projecting buildings, should not ordinarily extend on both sides of a marked summit in the grade.

The gas company will lay all mains and house services required within the project without expense to the Housing Corporation. The electric current for houses within the project will be supplied by overhead wiring, which will be run on poles located at the rear of the lots, there being no alleys, and hence the corporation has agreed to grant an easement for pole lines along these boundaries. The street lighting will be by means of iron posts which are 10 feet high, spaced about 100 feet apart. They will be placed on either side of the street on a line $2\frac{1}{2}$ feet inside of the curb line, and will be staggered. Each post will be equipped with a 100-candlepower lamp with refracting shades. Twenty-seven street lights are provided with underground wiring.

The houses of this project are excellent in design and will bear comparison with those of any of the other developments erected for the corporation. Whether one views front or side or inspects the details of doorways and porches, one realizes that the designers were thoroughly conversant with what is called "colonial" architecture.

The general development is, however, not without faults, and two are very noticeable. One is that all the houses appear to be set too high out of the ground. One reason for this is the impervious clay soil, which made the cellars hard to drain. The shrub planting will tend to reduce the apparent height of the houses but will never quite overcome the defect. Had there been two risers from piazzas to grade instead of five, a much better appearance would have been presented.

The other fault is that there is an unfortunate repetition of forms insufficiently relieved by the few changes at the front entrances. There are but three plan types of single houses, and only four different street elevations. Three of the front elevations are precisely the same except as to entrances, while the fourth type of exterior is the same as one of the others, except that the gable faces the street. All houses are clapboard and have green asphalt roof shingles.

In other developments erected for the corporation, where criticism has been made of too great a dissimilarity of houses (Davenport, Rock Island, etc.), the Bath project has been cited as an example of the opposite fault. Attention may be called to the houses of the Watertown development as being a happy medium, so far as variety is concerned.

The plans of the houses follow the corporation standards and have secondary entrances in all cases. A feature of the "A" house is the fireplace in the living room.

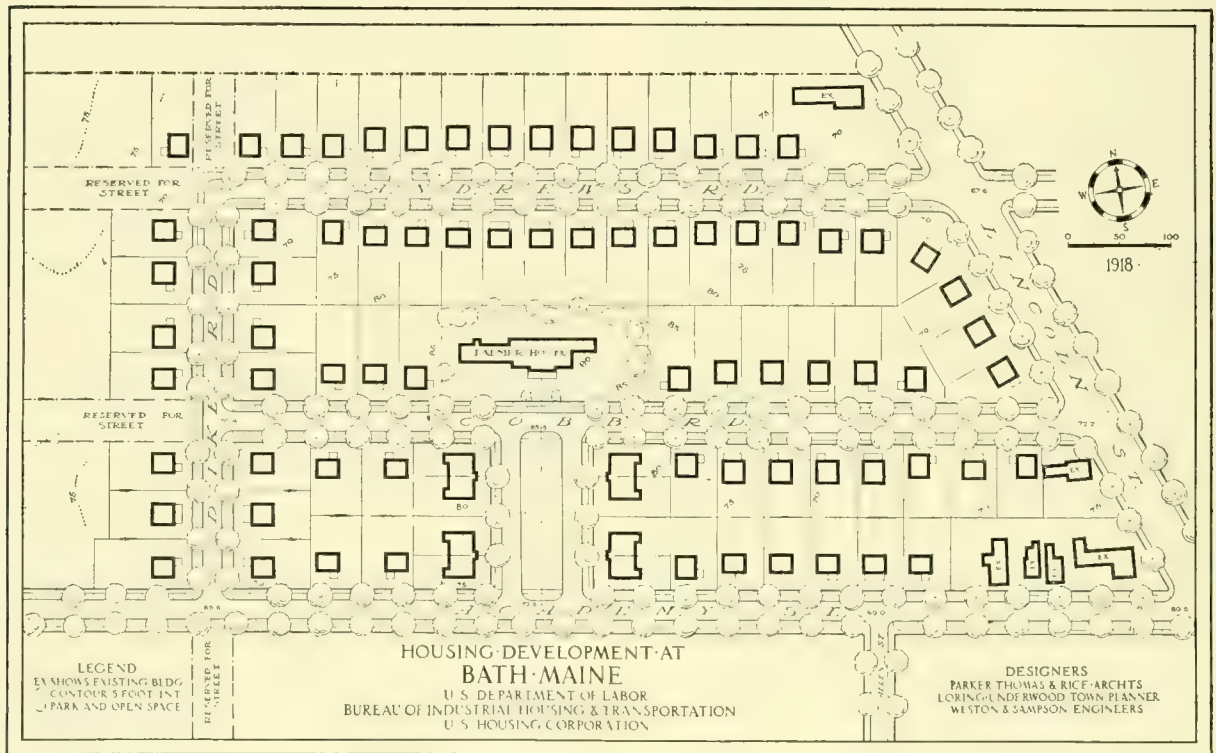
The four pairs of semidetached two-flat houses facing on Flaherty Park are very well planned and nicely designed, and, though they differ in style from the old Palmer house at the head of the park, they are not too inconsistent with its design.

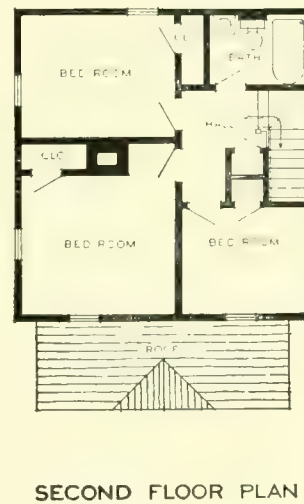
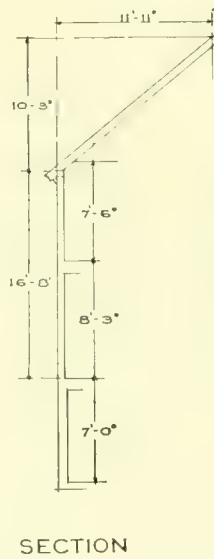
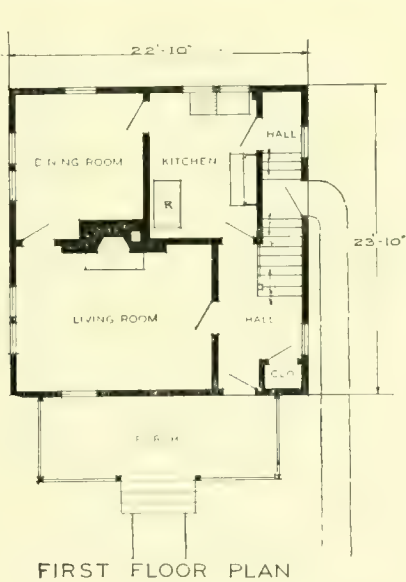
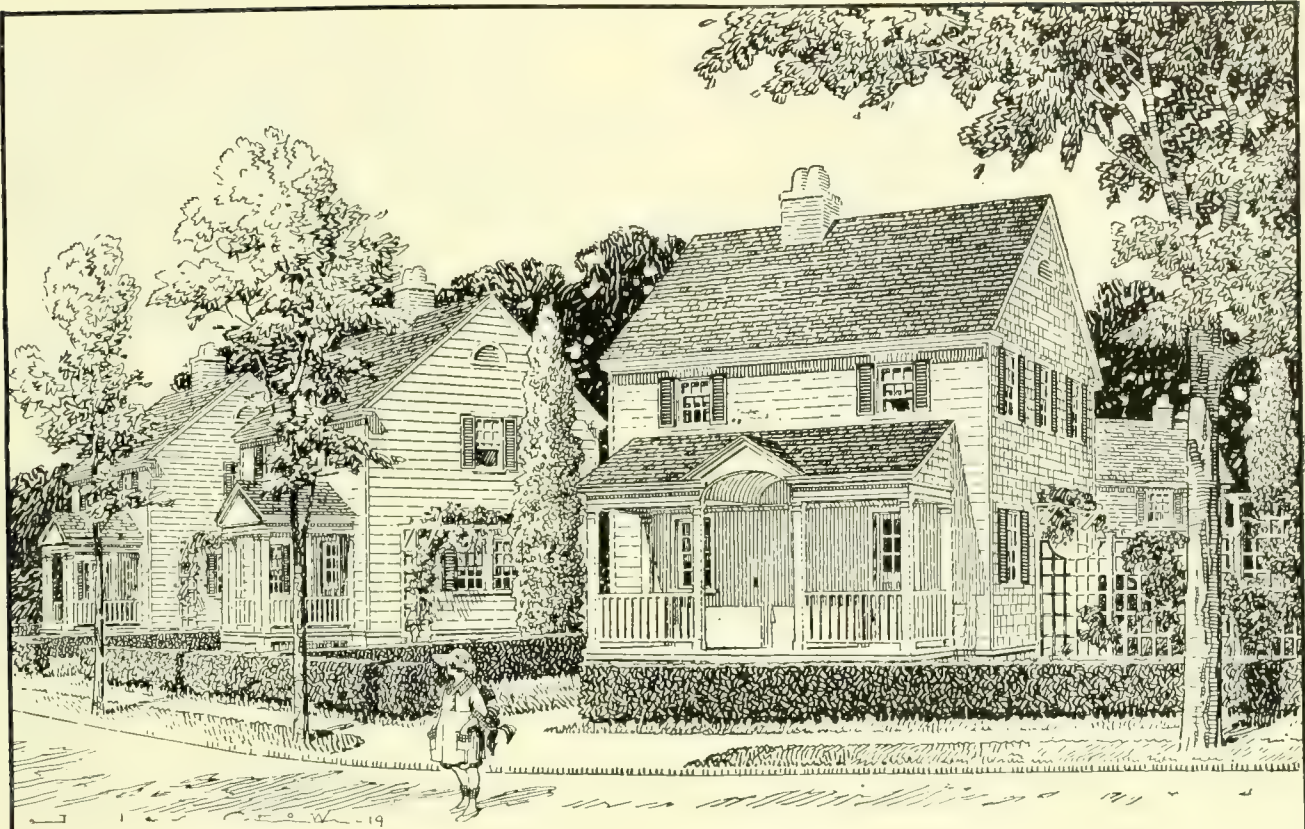
The old Palmer house is of pleasing appearance at a distance, its general form being simple in character, the columns suggesting a certain dignity of type altogether lost on close inspection of the details of design.

For the foundations of the new houses precast concrete in "rock-faced" blocks was the most economical available material. The outer surface is, however, smooth and well finished, this being made possible by setting the rough face of the blocks to show in the cellar.

For immediate economy the piazzas are supported by wooden posts instead of the usual masonry piers. Although the posts are set below

the frost line, this may not prevent it from raising them and with them the piazzas themselves, on account of the adhesion of the freezing soil to the sides of the posts. As in many developments, the general woodwork is not of first grade nor is the hardware in good taste, due to the war conditions, which necessitated the use of material of a secondary quality.



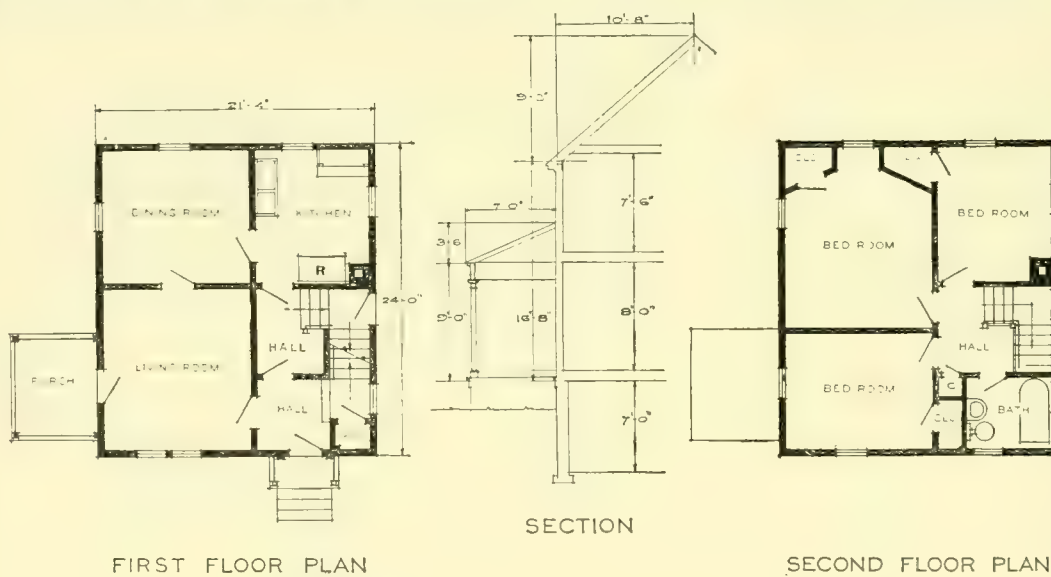
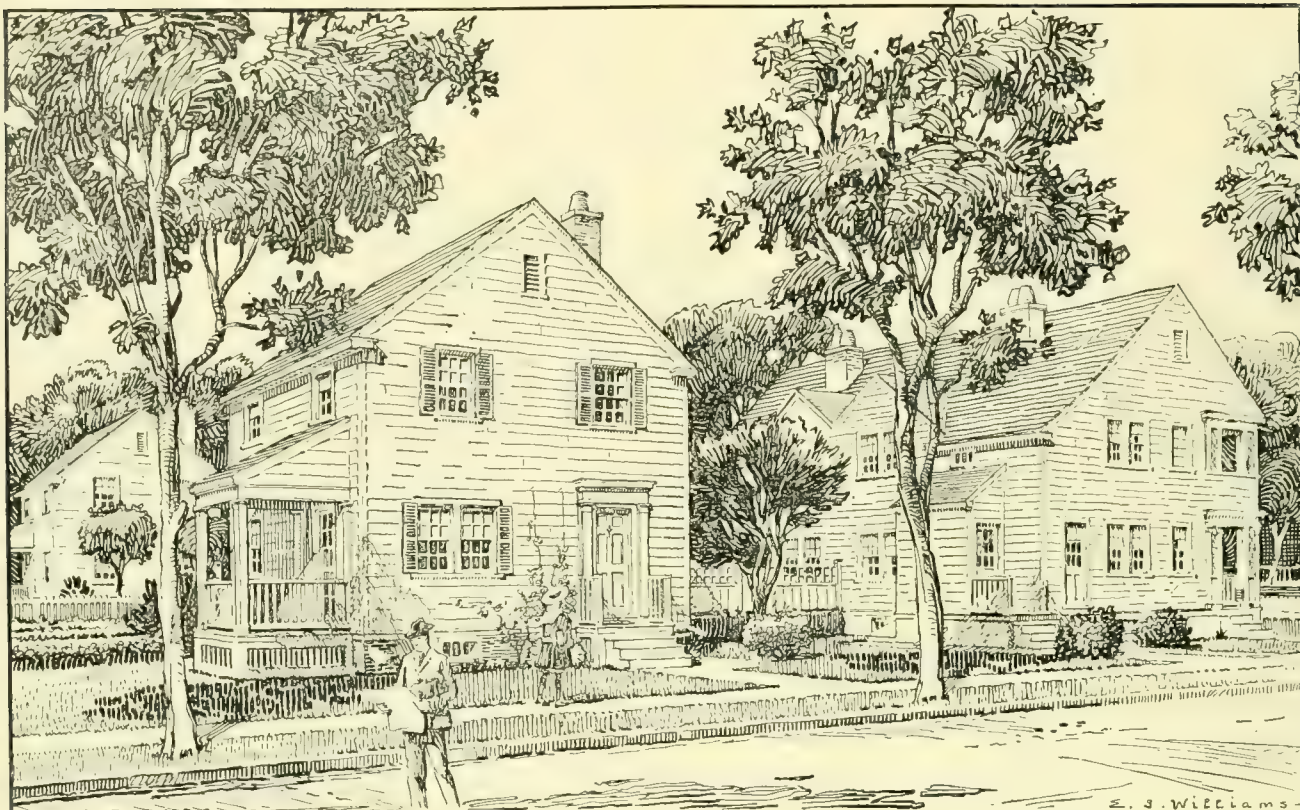


SIX ROOM HOUSE TYPE A

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BATH MAINE

ARCHITECTS PARKER THOMAS AND RICE

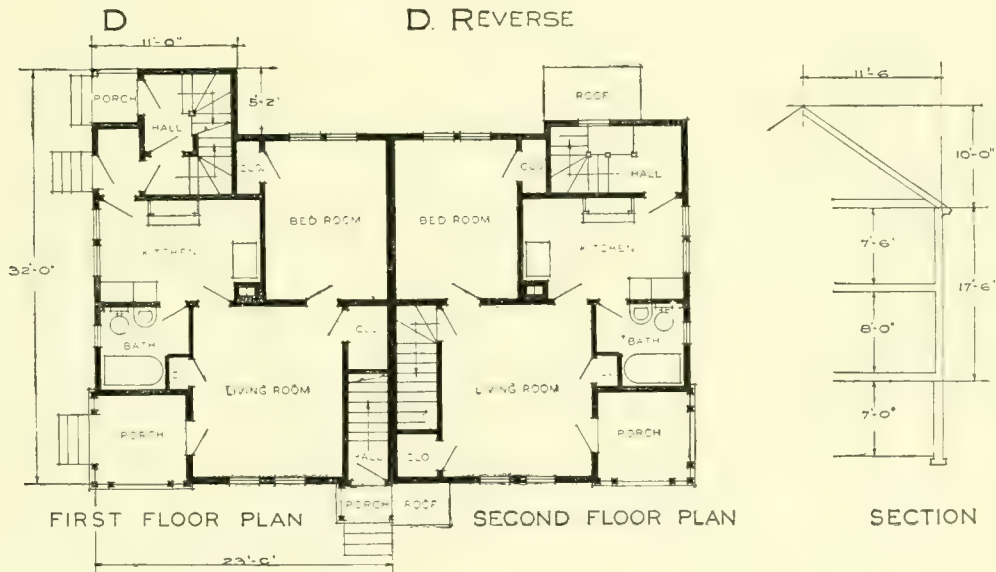


SIX ROOM HOUSE TYPE B

SCALE 5 10 15 20 25 FEET

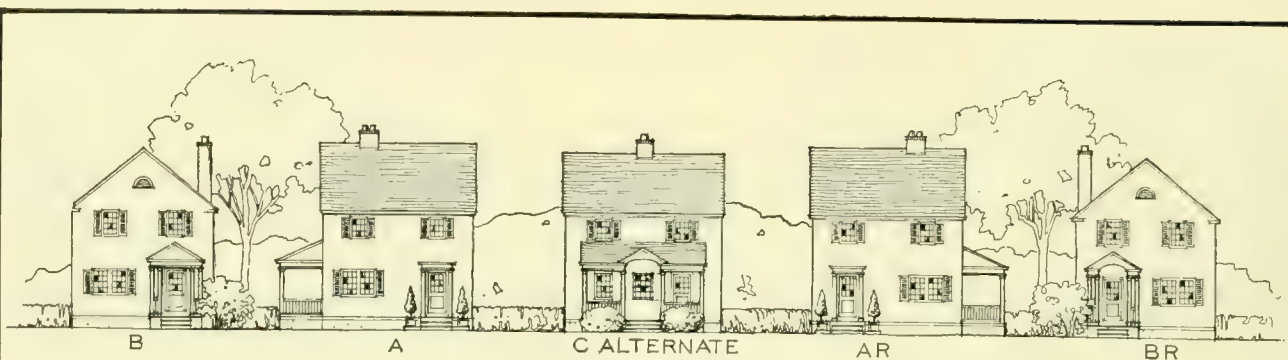
UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BATH MAINE

ARCHITECTS PARKER THOMAS AND RICE



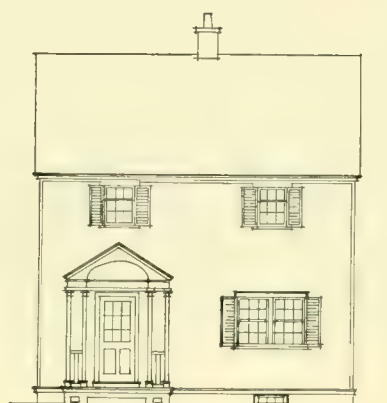
SEMI-DETACHED TWO FLAT HOUSES TYPES D AND D R

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BATH MAINE
ARCHITECTS PARKER THOMAS AND RICE



FRONT ELEVATIONS

SCALE 10 20 30 40 50 FEET

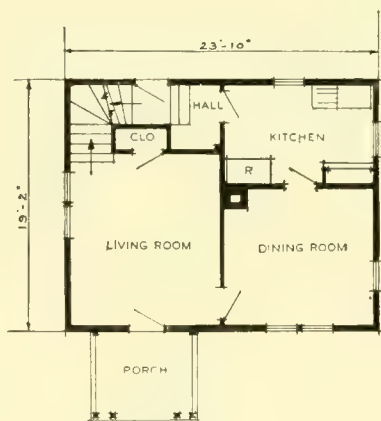


FRONT ELEVATION

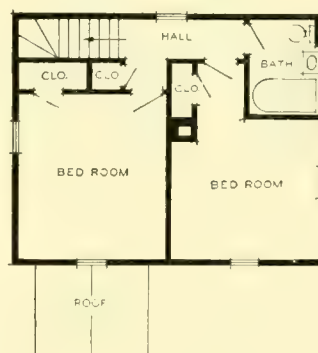


SIDE ELEVATION

SCALE 5 10 15 20 25 FEET



FIRST FLOOR PLAN



SECOND FLOOR PLAN

FIVE ROOM HOUSE

TYPE C

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BATH MAINE

ARCHITECTS

PARKER THOMAS AND RICE

BETHLEHEM, PA. (PROJECT NO. 24).

Area planned: 170.80 acres. Housing planned: Detached houses, 32 families; semidetached houses, 230 families; row houses, 931 families; apartment houses, 65 families: total, 1,258 families.

(Project discontinued. For further information see tables, Chap. IX.)

Bethlehem, in eastern Pennsylvania, is a compactly built group of five boroughs now being consolidated in a single city with a population of about 70,000, lying on both sides of the Lehigh River. The Bethlehem Steel Co., in the southeastern part of the town south of the river, is the only large industry. It had in 1918 \$75,000,000 in war contracts from the Navy and \$50,000,000 from the Army, not including its own steel business. The company employed approximately 28,000 men, but with a turnover of 40 per cent a month it was necessary to bring in about 400 new men every day.

In 1917, the Bethlehem Steel Co., realizing the great need for housing, especially in order to retain the services of machinists and other high-grade employees, began to make provisions to improve the situation. The Saucon Land & Improvement Co. was organized, a tract of land purchased, a town site plan was prepared by Alexander Potter, consulting engineer, assisted by L. J. H. Grossart, engineer for the steel company, the contract was let, and several barracks were built for housing workmen to be employed on the construction. It is reported that the passage of the war-revenue act and a lack of funds for the financing of such an enterprise led to the cancellation of the contracts and the payment of damages.

In April, 1918, the Housing Bureau, following various preliminary investigations and a final report on the site, determined that Government aid for housing was essential at Bethlehem and sought for a site adequate for possibly 2,000 houses.

The mountainous character of the country south of the river did not afford any single large housing tract there short of 3 miles away. North of the river there was sufficiently level land in all directions, but the built-up portion of Bethlehem already occupied all but scattered small areas of the land to the west, making the open land too far from the plant in this direction. To the east, however, were 1,000 acres of available land including the site already bought by the Bethlehem Steel Co. for housing, as we have said.

This site appeared to the bureau's investigators to be the best available for so large a project, though its precise boundaries might have been fixed differently had the property not already been purchased for the purpose. It is the only large area of reasonably level land which is both near the works and near the town center of Bethlehem. It is within 1½ miles of the principal works gate via the Minsi Trail and bridge. On the west toward the city there is a narrow belt of vacant land which might have been included, had it not been held at a high price.

The tract consists of several old farms sloping for the most part gently to the southwest, though the more distant portions, which were not used for the building project, slope gradually to the southeast and to the north, necessitating a separate drainage system. Near the southeast boundary of the tract Pembroke Road is an existing highway into the city; along the north boundary William Penn Highway also leads in the same direction. On the lower west side Minsi Trail is an unopened through street connecting with Washington Avenue, leading as a circumferential highway around the city to the northwest. There had already been platted through the tract one main diagonal artery, Newton Avenue, on which a car line was planned. This led through its extension across an adjacent tract directly to the end of Broad Street, Bethlehem's principal thoroughfare, from which point Minsi Trail passes over the Minsi Trail Bridge to the Steel Works. For the present Pembroke Road is the principal approach, but ultimately Newton Avenue and Broad Street will probably become more important.

The town plan recognized existing street conditions, retaining Newton Avenue widened, and extending Washington Avenue through to Pembroke Road. A reasonably direct secondary route to the north is also provided in Roland Street. Otherwise the streets were designed primarily to give access to the various portions of the tract, and to provide well-shaped building lots. The reasonable arrangement of streets according to topography and traffic

produced a main junction at Washington Avenue and Newton Avenue. Since practically all the foot traffic between the development and the plant went by this place, we located the stores and the moving-picture theater here, giving importance to the cross-roads open space as a minor civic center.

On the main line between this center and the Minsi Trail Bridge, Newton Avenue, which should eventually serve as the main entrance to the development, runs through a valley the sides of which were not controlled by the Housing Corporation. We were planning to come to some arrangements with the owners of this land to avoid the possibility of a poor development of this street which would distinctly injure the value of all our holdings.

Near the center of the tract a somewhat rough block with an old quarry site and knoll was set apart for a park. Diagonally across the street corner from this, to the southwest, a school site was planned, and was to be developed by the city school board in conjunction with the house building program. A second school site was planned to the northeast in conjunction with the future extension of the project. These school sites, while not central to the Housing Corporation's tract, did serve in each case a district of the future city. A second smaller store center was planned for the future on the extreme eastern edge of our initial development to serve its surrounding area when this should eventually be built up.

There are no alleys, since the row houses have their service entrances in the front. "Blockways," that is, easements through the blocks, have been planned in every case, however, so arranged that they could be opened as alleys if at some future time this should be necessary, which we did not anticipate or desire. There were various local circumstances and unexpected changes of policy which made the plan of these blockways just what it is. We believe that ideally the blockways should have been designed with less attention to the shape of the lots, and with more attention to continuous straight runs and connections from one block to the next, both for their possible later service as alleys and for their important immediate service as locations for pole lines.

As the property lies in a gentle valley, with its outlet near the southwest corner of the site, draining more area than that which we were to develop, the surface drainage problem was a difficult one. The run-off from this area, which had

to be taken through the heart of our development, was so great that it was inexpedient to undertake the work or to pay the cost at this time of constructing underground pipes sufficient to take the predictable maximum flow. We therefore planned for these large conduits only where the development made it necessary, elsewhere carrying the water, where concentrated, in open ditches running across the blocks, in such locations that at some future time the pipes could be put in, the ditches filled, and the easement used also as an alley if necessary, as it was from the first used also as a "blockway."

The Bethlehem Steel Co. believed that the dwellings to be built by the United States Housing Corporation would be in permanent demand after the war. As a difficulty of the industry is to hold its highly trained and in consequence better paid workers, the proposed buildings were to be of good materials, well laid out with all possible modern conveniences in units for occupancy by single families.

A canvass of workmen's families was made to determine the desirable type of house and, unlike many other projects, it was found that the six to eight room house was most in demand. It is a local custom when a house is taken by one family and one or two rooms rented to single persons to have the extra two rooms in a high attic, toilet and wash basin accommodations being provided there.

As the site chosen was difficult of access for delivery of materials by railroads, under the conditions prevailing at the time when construction was to start, those materials available in the immediate locality were planned to be used—brick, cement, and slate. A style of design somewhat Dutch in character was chosen as conforming to local traditions and the preferences of the workers.

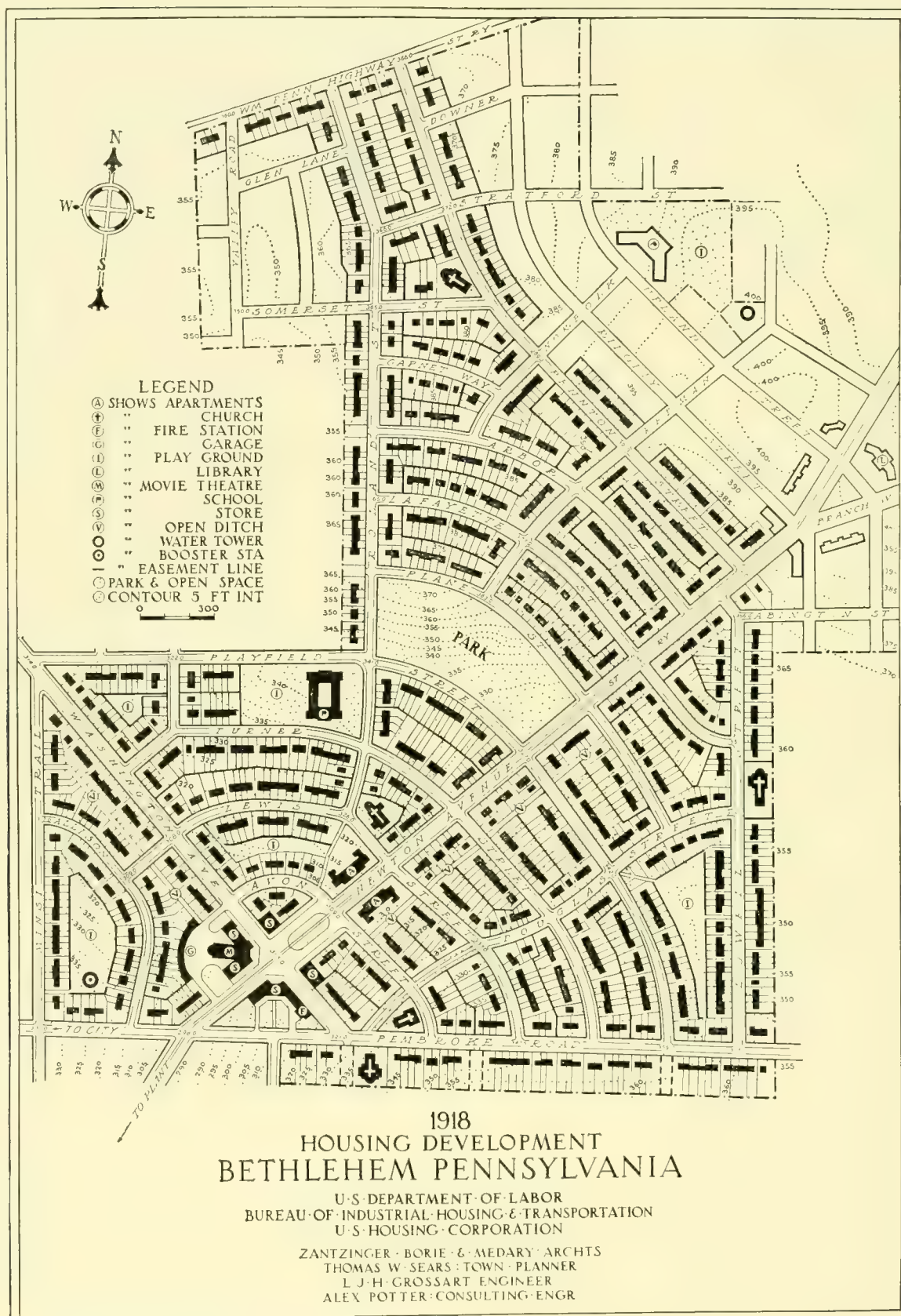
The architectural interest of the whole project is focussed at the civic group. This group is composed of four store-apartment blocks at the entrance to the village and two apartment houses standing one on either side of Newton Avenue at the other end of the little common. Two rows of three houses each and one pair of semi-detached houses complete the group. The store-apartment buildings are in block form, extending in unbroken line around the street corners and back along the entering streets. Incorporated in one block is the public auditorium; in another is incorporated a fire-engine house and a village belfry.

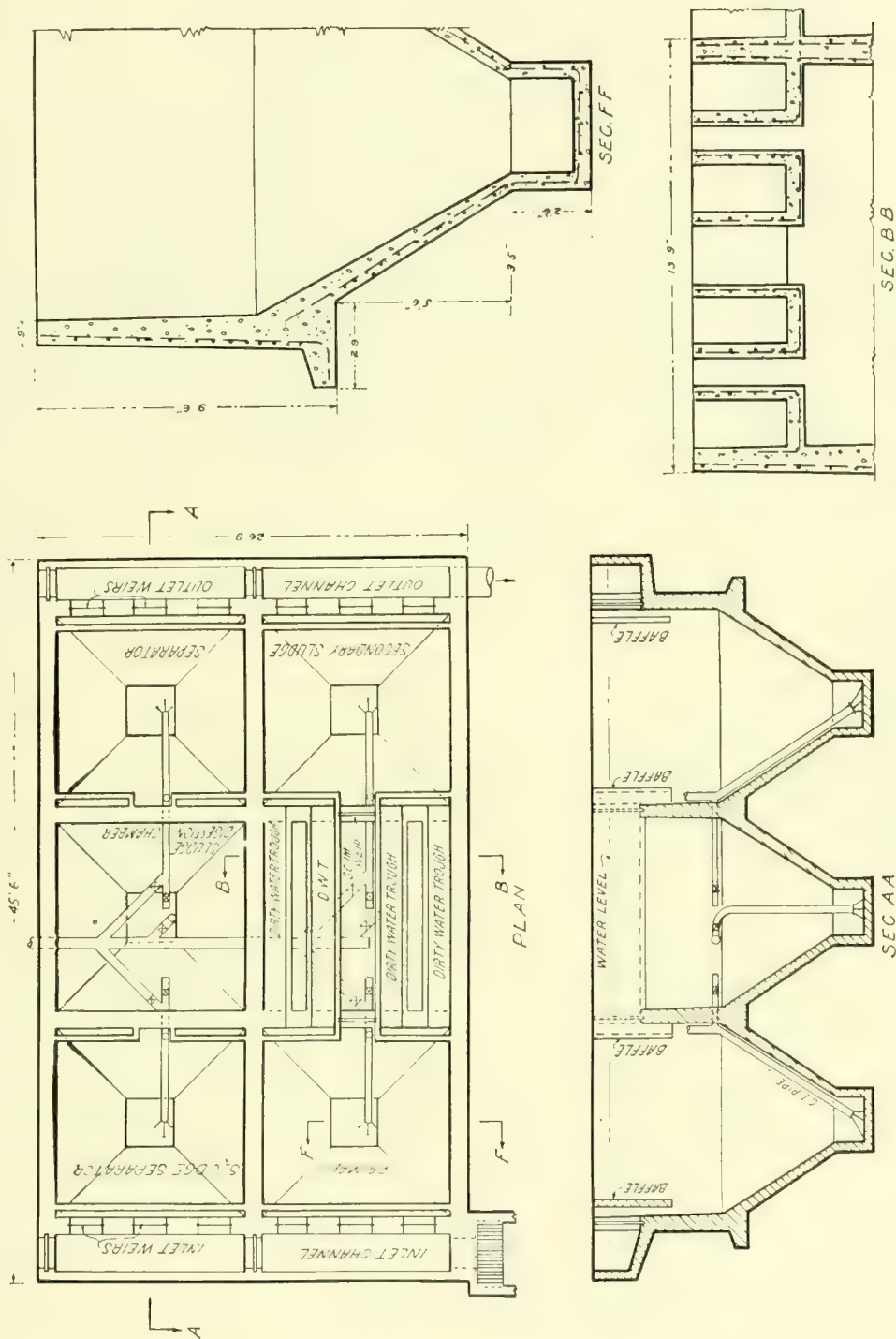
The apartment buildings have stores on the street floor and two stories of apartments over them. These apartments are of the four-room type extending through the building from front to rear with front and rear entrances.

The houses were planned in nine types, the great majority with six rooms, 10 per cent having two extra rooms in the attic. Only a very small number are detached houses. These types are grouped in many combinations to insure variety. A general characteristic of the designs is the use of high

pitched roofs which permit the attic rooms where called for, and the large porches.

Perhaps too great a diversity of designs and combinations of houses was used at Bethlehem. The use of porches with flat roofs at short intervals along a block of houses already broken in outline tends to an uneasiness of composition. (Note perspective group, type B.) Interest might have been more simply obtained in some cases by a variety in grouping rather than by a variety in type of houses.





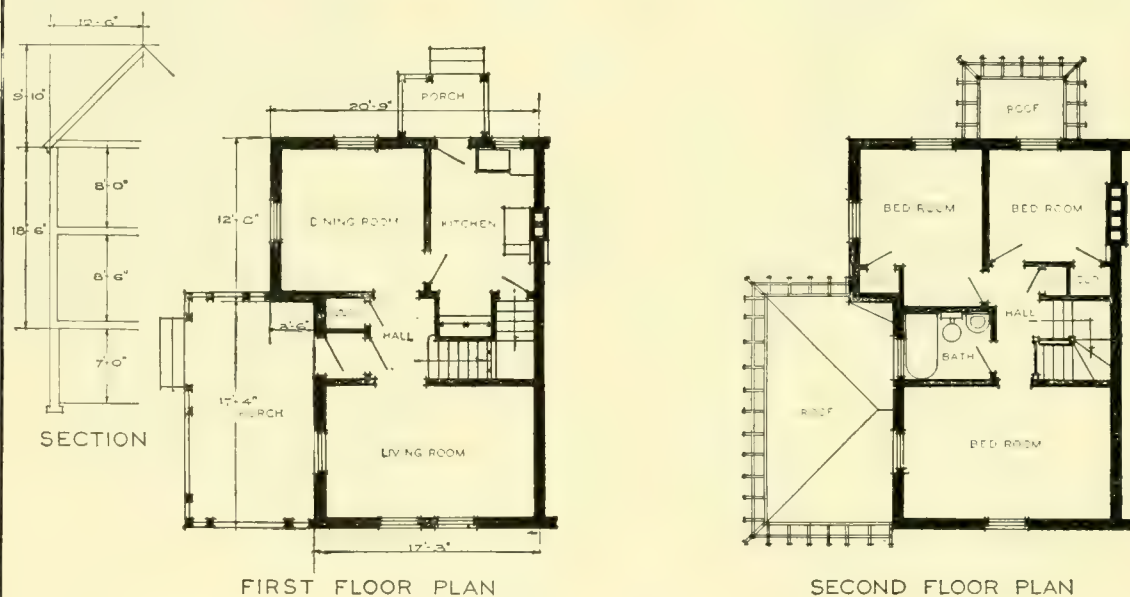
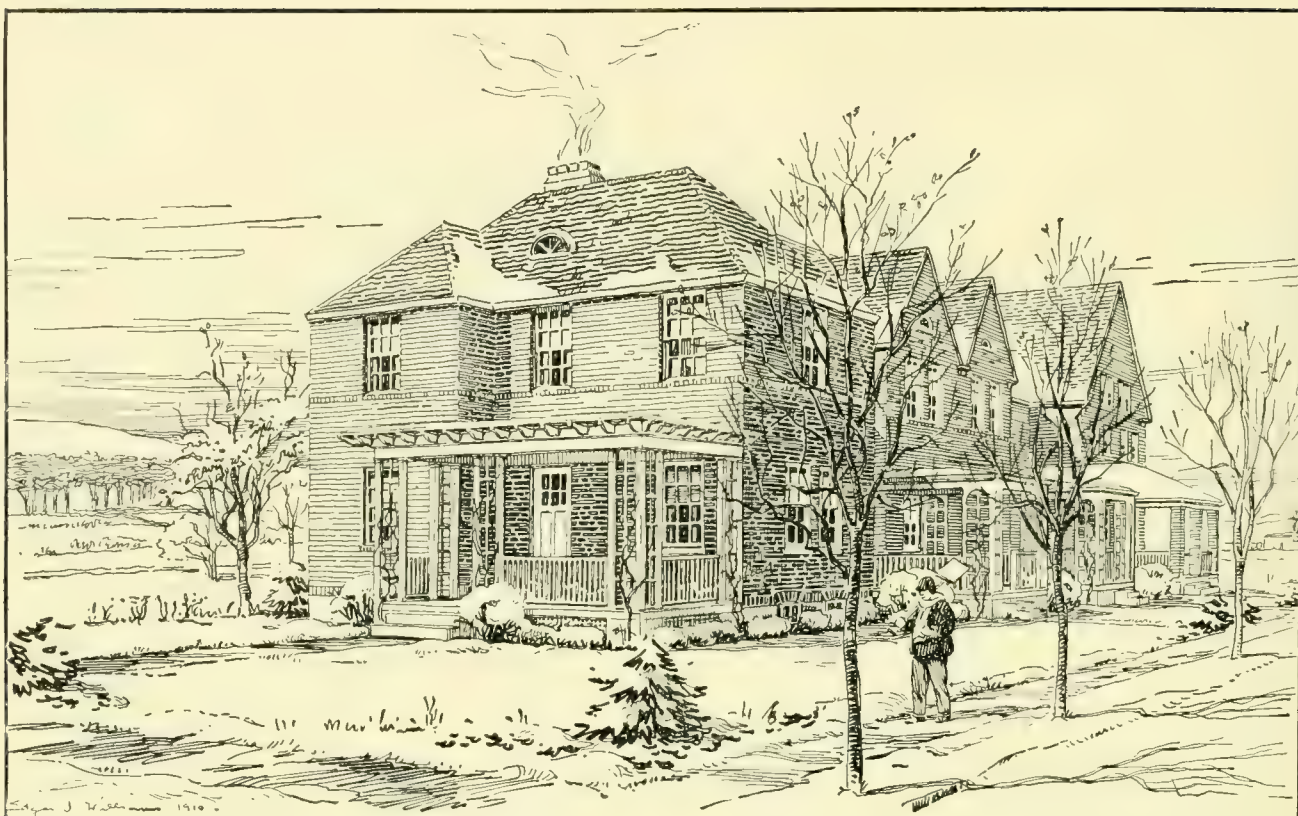
SEWAGE DISPOSAL PLANT BETHLEHEM, PA.

SHOWING SEPARATING TANKS.

BASIS OF DESIGN 647 HOUSES OR 3900 PEOPLE

@ 80 GALS. PER CAPITA PER 24 HOURS

U.S. DEPT. OF LABOR BUREAU OF INDUSTRIAL HOUSING AND
TRANSPORTATION U.S. HOUSING CORPN. ENGINEERING



FIRST FLOOR PLAN

SECOND FLOOR PLAN

SIX ROOM HOUSE TYPE B

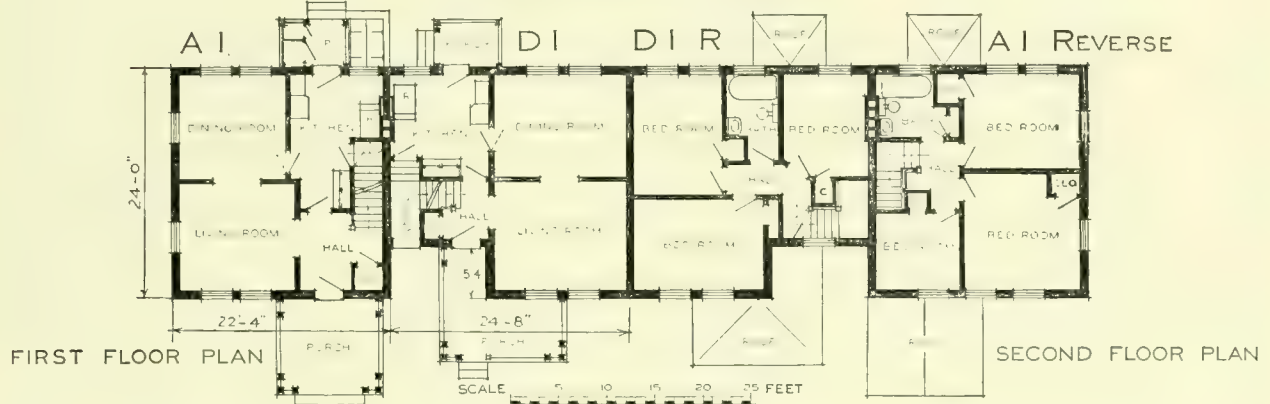
SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT BETHLEHEM PA

ARCHITECTS ZANTZINGER BORIE AND MEDARY



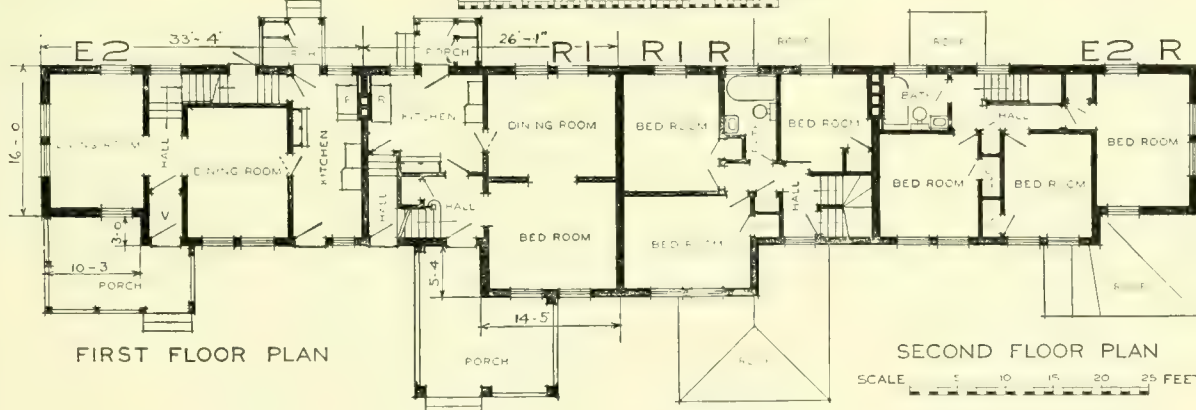
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SIX ROOM ROW HOUSES GROUP 2508 TYPES A1 AND D1



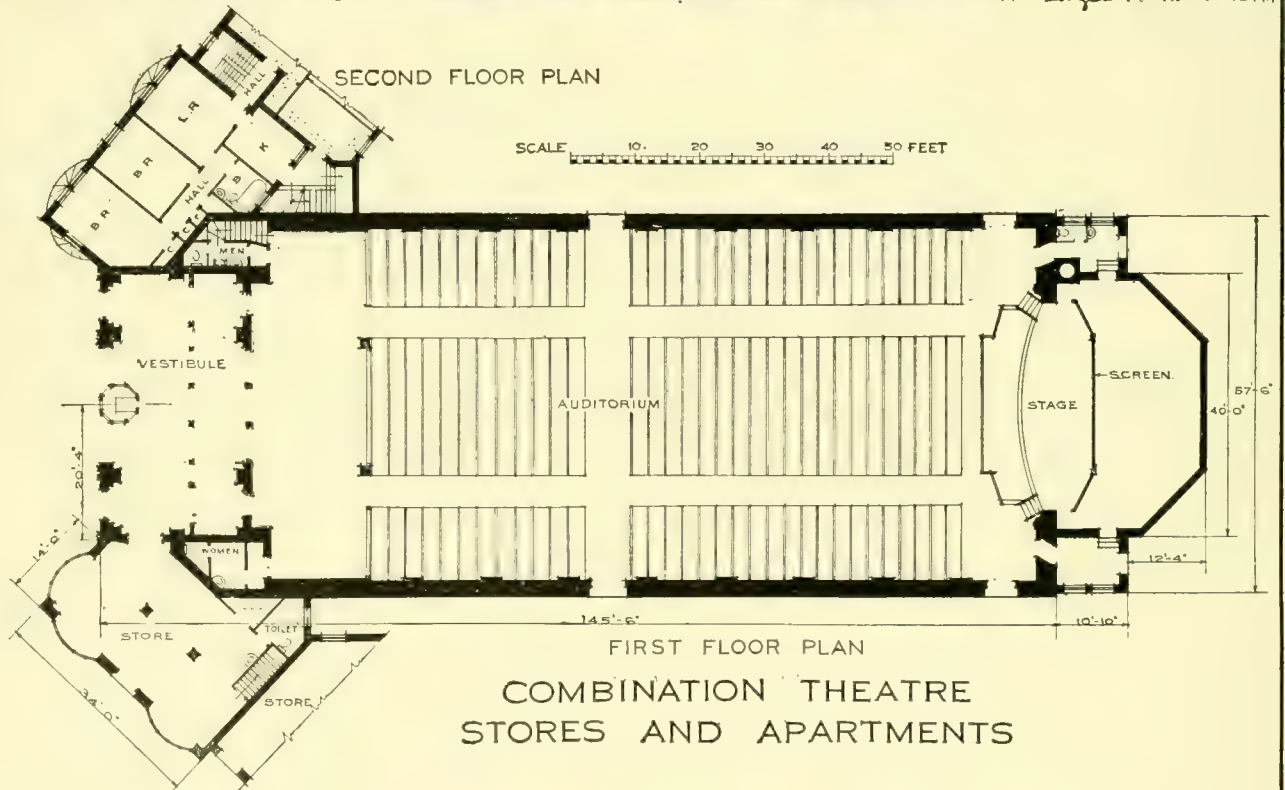
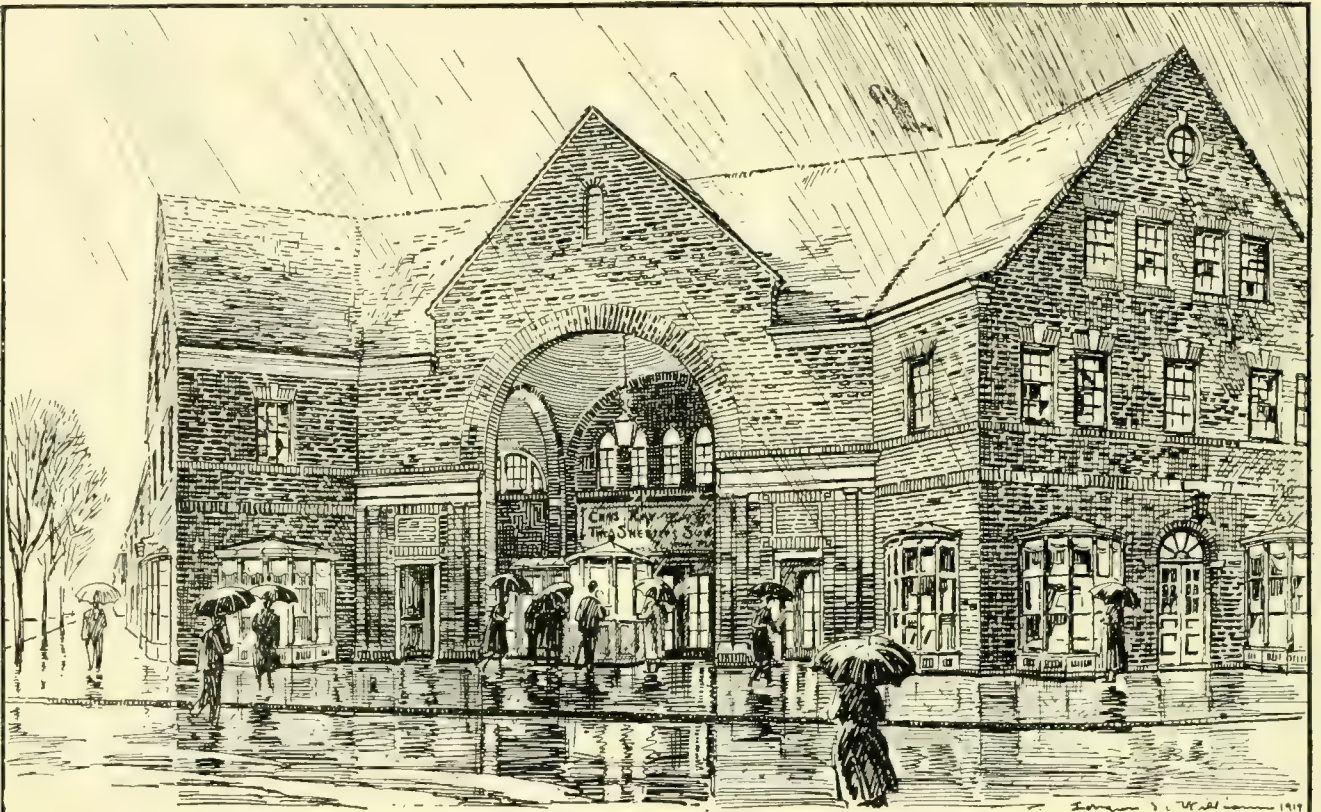
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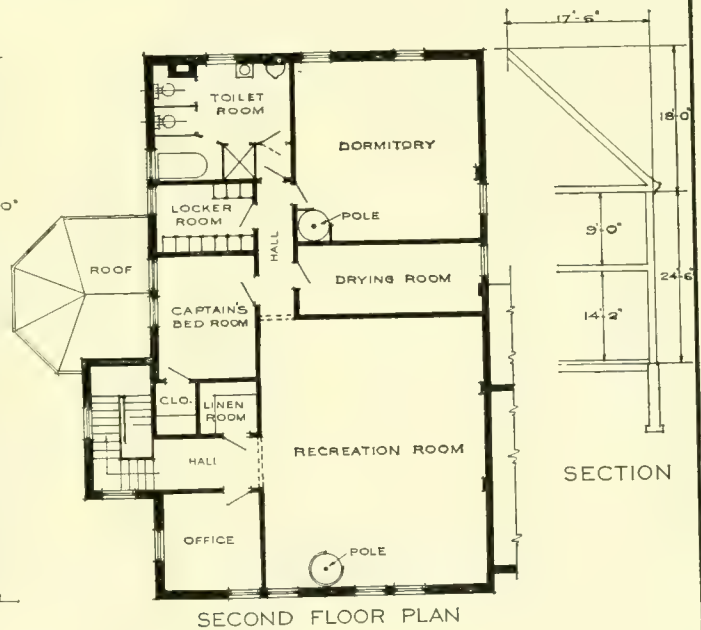
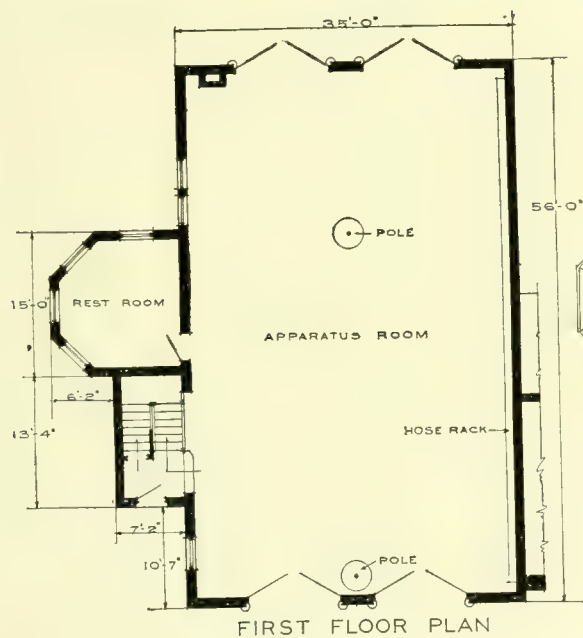
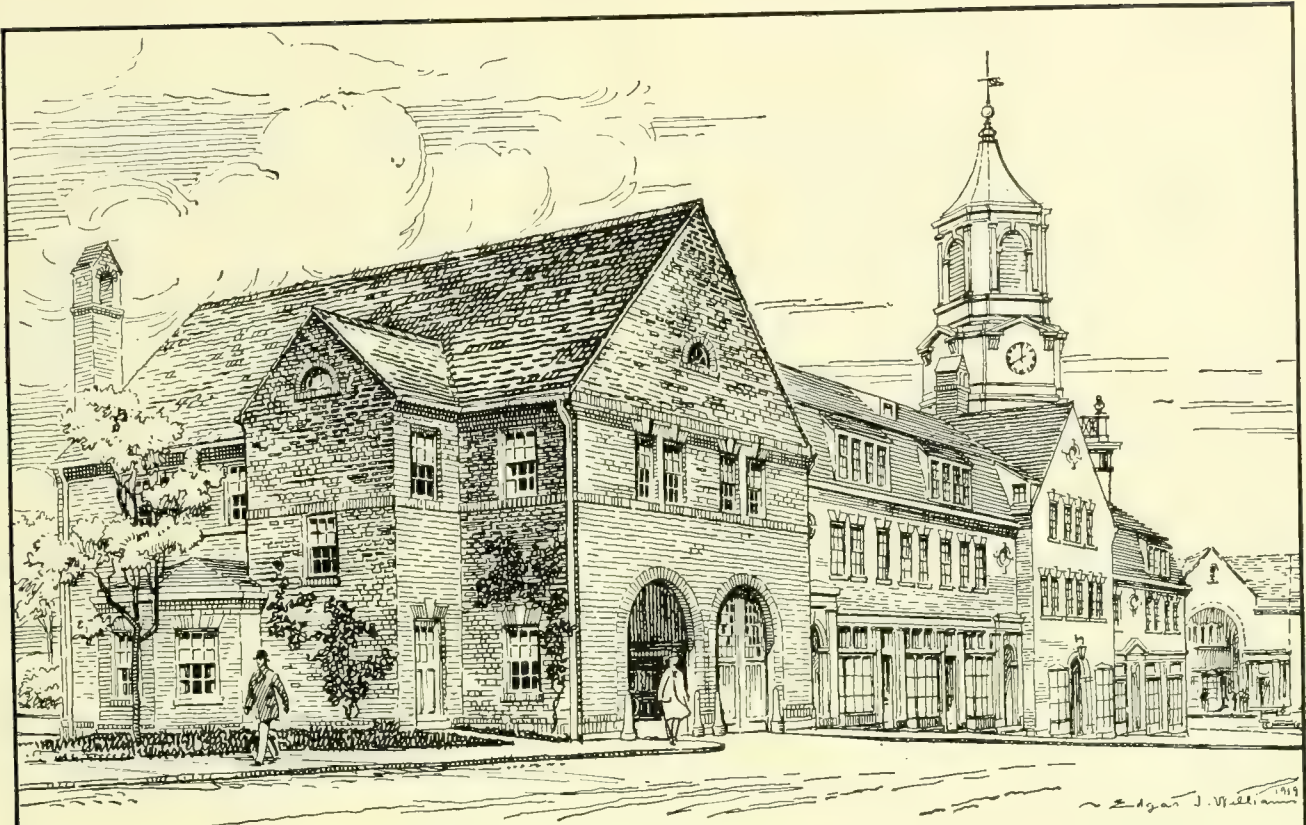


SIX ROOM ROW HOUSES GROUP 2809 TYPES E2 AND R1

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT BETHLEHEM PA

ARCHITECTS ZANTZINGER BORIE AND MEDARY





FIRE HOUSE

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT BETHLEHEM PA

ARCHITECTS ZANTZINGER BORIE AND MEDARY

BRIDGEPORT, CONN. (PROJECT NO. 102).

Bridgeport, Conn., is a good illustration of the wholesale way in which some of our manufacturing towns adapted their various industries to war service. Besides the great plant of the Remington Arms Co. there were in Bridgeport before the war its textile manufacturies and a multitude of smaller industries turning out a great diversity of goods. When the Housing Corporation investigated conditions in 1918 it was reported that the workers still employed in "nonessential" industries were relatively so few in number that if they were all turned to war work the war-labor situation would not be materially changed.

Bridgeport is on the northern shore of Long Island Sound, about 56 miles east of New York City. The population had grown from about 115,000 in 1910 to about 200,000 in 1918. In the larger industries there were over 43,000 men and over 10,000 women employed, and about 10,000 more workers were hoped for.

The Bridgeport manufacturies had in 1918, \$50,000,000 worth of work under contract for the Army, and \$10,000,000 worth for the Navy. The housing shortage in Bridgeport was one of the first to come to general notice. It was specially remarked in the report of the Committee on Labor of the Council of National Defense, in 1917, long before the Housing Corporation was organized.

Both skilled labor in special trades and common labor were entirely inadequate to the demand. The typical conditions of overcrowding, high rents, unsanitary living and intolerable waste and delay from labor turnover were found here in an aggravated form.

In one respect the conditions were not as repugnant to men with families as in many other towns, namely in regard to schools. There was a great shortage of grammar schools, and 15 per cent of the pupils were on part time; but the schools were well distributed, and a strong building program was under way, supported by a 1-mill tax and a heavy bond issue. There were several well equipped junior high schools.

The Bridgeport Housing Company had undertaken at the beginning of the war to do what they could to finance the building of proper working-

men's houses, but construction cost and the overwhelming demand soon became more than any private investor could meet.

After many conferences with representatives of the industries and of the Connecticut Company which operates the trolley system in this territory it was decided that the transportation problem could be met best by improving the facilities of the Connecticut Company by track extensions and the purchase of additional cars.

Under date of July 31, 1918, an agreement was made between the United States Housing Corporation and the Connecticut Co. for the loan of approximately \$1,350,000 for additional rolling stock and track extensions as follows:

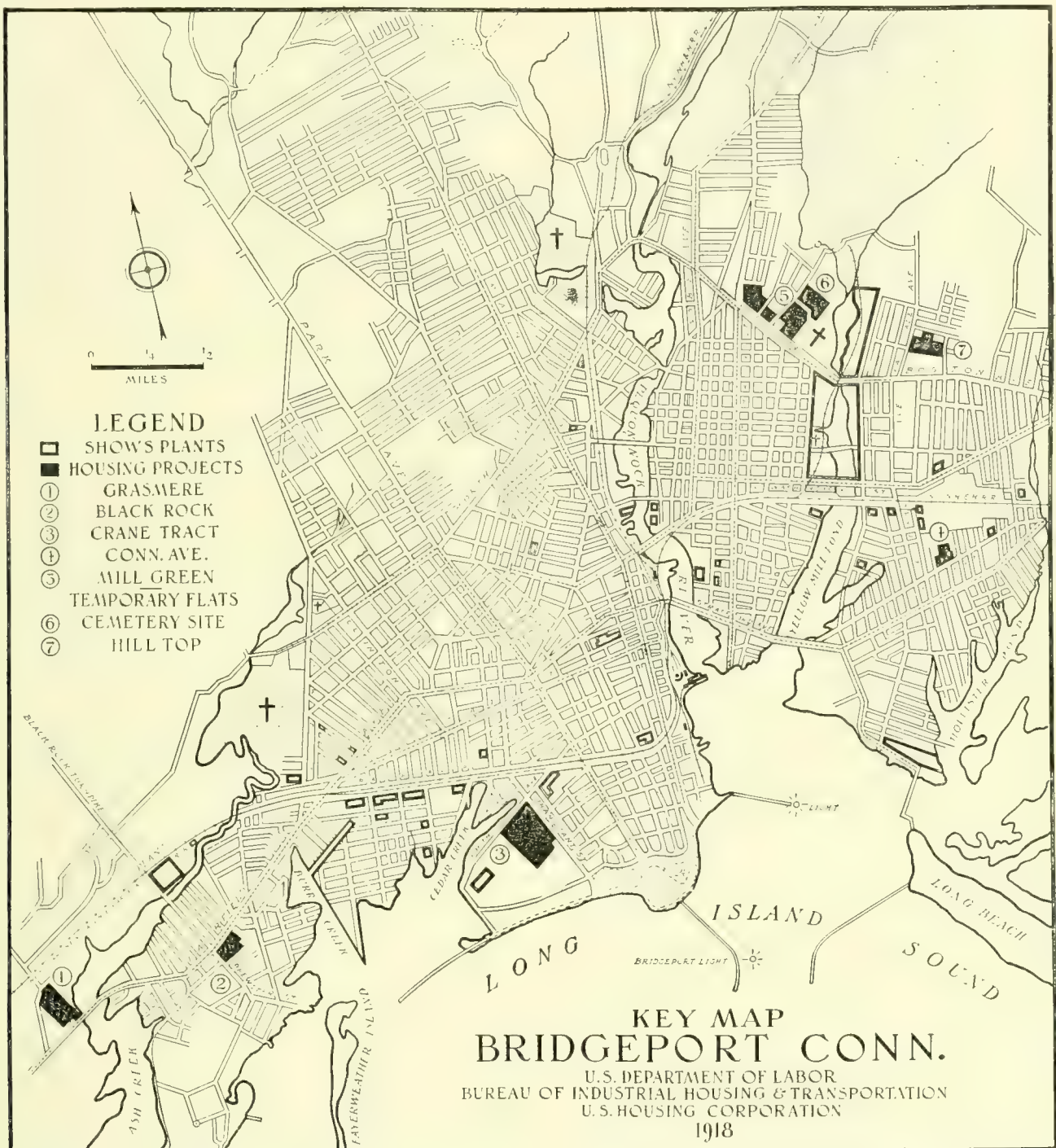
Twenty 1-man "safety" cars	\$140,000
Fifty Connecticut Co. type of suburban cars.....	800,000
Addition A, a double track extension on Housatonic Avenue from the company's tracks on Congress Street to the tracks on Golden Hill Street.	
Addition B, a double track extension on Water Street from Fairfield Avenue through the so-called plaza to be established by the city in State Street connecting with the existing tracks at Main and State Streets.	
Estimated cost, Additions A and B.....	174,000
Addition C, a double track extension from the vicinity of the Remington Arms Co.'s plant through Boston Avenue to connect with the existing tracks at Barnum Avenue.....	
	150,000
Addition D, a single track connection on Boston Avenue from East Main Street to North Avenue.....	
	50,000

On August 29, 1918 the traffic committee of the Chamber of Commerce of Bridgeport entered a protest to the Connecticut Co. against Addition C, stating their belief that the existing trackage would take care of the situation. Addition C, was finally abandoned by common consent. Double tracking was the main feature of the construction work; this being the only means by which congestion in the center of the city could be properly relieved.

The United States Housing Corporation examined and considered in detail about 20 housing sites, and finally decided upon 7 (two of which, for temporary housing, were abandoned on the signing of the armistice), so located and distributed as to bring the greatest practicable number of workers within walking distance of their work. (See p. 000.) The ruling land values in and near Bridgeport were

high as compared with other cities where we operated, except Philadelphia and Washington, making the development more intensive than usual.

$2\frac{1}{2}$ miles from the center of the city, conveniently accessible from many plants in the western manufacturing district, and adjacent to the Government-



Black Rock Tract.

Area planned: 6.77 acres. Housing planned and constructed: Apartments, 216 families. Central heating plant. For further information see tables, Chap. IX.

This site is on Fairfield Avenue, the main thoroughfare and street railway line to the west, about

owned "Bullard" plant. It is on the summit of a gentle rise in a very flat area and included a number of large trees, most of which were utilized to good advantage by ingenious planning. The high land value and a strong local demand led to the adoption of the apartment-house type in a series

of more or less connected units, each consisting of a three-story, six-family, two-room deep, brick apartment house with living porches and service entrance on the side opposite the main entrance with a central heating plant for the entire project, but with each unit so arranged as to make possible independent ownership and the installation of a separate heating unit.

Several stores existed in the neighborhood, others were likely to spring up, and the stores, amusements, and other features of community life in the central district and elsewhere are so easily accessible as to make special provision for them unnecessary in the project.

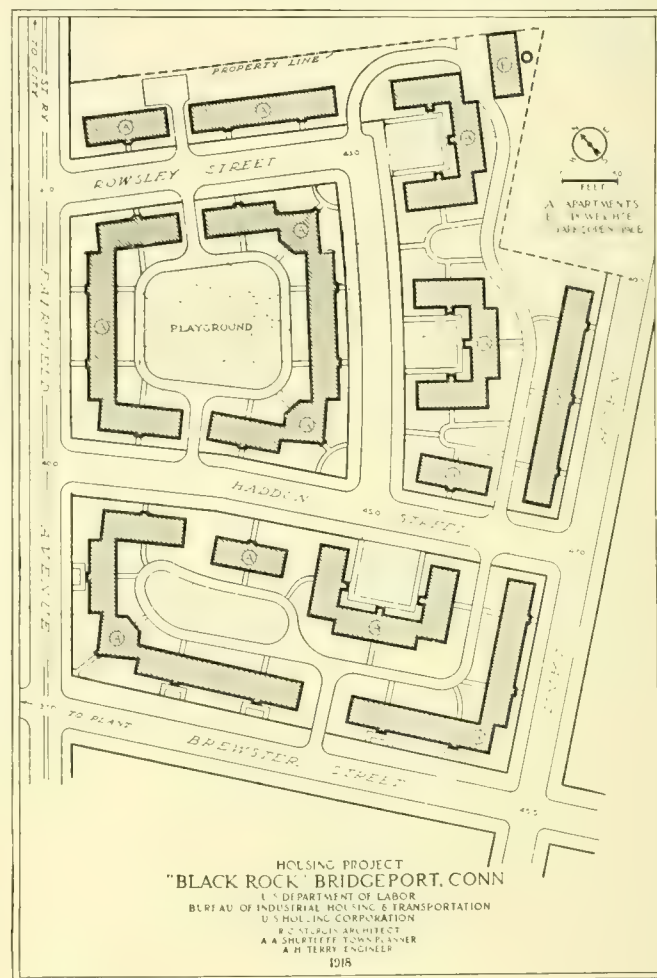
Taking full advantage of the irregularities of the site, and unhampered by any supposed necessity for subdividing the property into conventional lots of standardized depth adaptable to various possible uses, the general plan disposes 33 rectangular building units of two closely similar types and three units of a special "corner" type in a manner which gives a density of population (31.9 families per acre gross) which compares favorably on an economic basis with the density of typical "three-decker" districts, while providing ample light and air and a pleasant outlook for every room and every apartment, and also a surprisingly picturesque and attractive general appearance. The U-shaped groups of three units, housing 18 families about a wide court open to the street, are adaptable to use on ordinary lots 100 feet in depth, although with a rather cramped space in the rear; the units in row parallel with the street are used on lots about 50 feet deep. The spaces inside of the two loops of service road are intended for joint use by the occupants of the surrounding apartments as small private parks or play spaces, in part shaded by trees and in part open.

Brewster Street, an old cross-town highway of some prospective importance, is likely to be widened by the city, and the normal setback for planting in front of the buildings was therefore increased to provide for this widening.

The kind of apartment buildings constructed for the United States Housing Corporation at Bridgeport are new to that city, both in scheme or layout and in appearance. Heretofore apartments have been built in Bridgeport and indeed generally elsewhere with at least one if not more rooms facing either a shaft or a small court or side yard, but the ones under consideration have neither shaft nor

court and every room has direct outside lighting and ventilation. This is obtained by making the apartments only two rooms deep.

The entire layout is a repetition of only three different plans of three, four, and five room units, so simple as to allow of their being placed in many relative positions and giving great flexibility in solving problems resulting from an odd-shaped plot of ground. The plan, also, because of its repetitive character, makes for economy in construction. The idea evolved is one of marked value and worthy of greatest consideration for any similar development.



Each type plan will bear close inspection, and one fails to find any serious flaw but many good points. It would be difficult even in so large an undertaking to improve the plan either in detail or as a whole.

The simplicity of the layout is reflected in the exteriors, which are of common brick so laid and jointed as to produce an effective though plain design without other relief than is given by the oft-

repeated bay windows of living rooms, by the special treatment of certain windows in the five-room type, and by the entrance porches. One would prefer to see these porches a more integral part of the building (which they could have been made had their inclosure walls been of brick instead of wood), and it would have looked better if over the bay windows the flashing had been less visible; but these are details. Viewing the buildings in mass these faults seem very slight.

It is at this project that a system of plumbing has been installed which for economy of material and labor surpasses anything of its kind done on so large a scale. It is a system which omits back venting and where nonsiphoning traps are used.¹

Connecticut Avenue Tract.

Area planned: 3.02 acres. Housing planned and constructed:

Apartments, 108 families. Central heating plant.

(For further information see tables, Chap. IX.)

This site is on one of the main thoroughfares to the east, one block from the main car line, about a

eastern manufacturing district. It is perfectly flat and backs up at the north against a large ordnance plant. The development is similar in type to that of Black Rock, but smaller and on a less interesting site, and also as compared with Black Rock it lacks the pleasing facade of the five-room apartment units, six of which add much to the interest of that development. Otherwise the building units are identical with those at Black Rock. A somewhat more economical general plan for this tract would have been possible without introducing the public street called Ordnance Court, the purpose of which was to give two street approaches to the interior of the property and avoid making Wilmot Avenue a "dead end" street, which could not have been legally accepted by the city as a public way. The circular turn beyond the north line of Ordnance Court, which in fact forms the end of Wilmot Street, will remain a private courtyard.

Crane Tract.

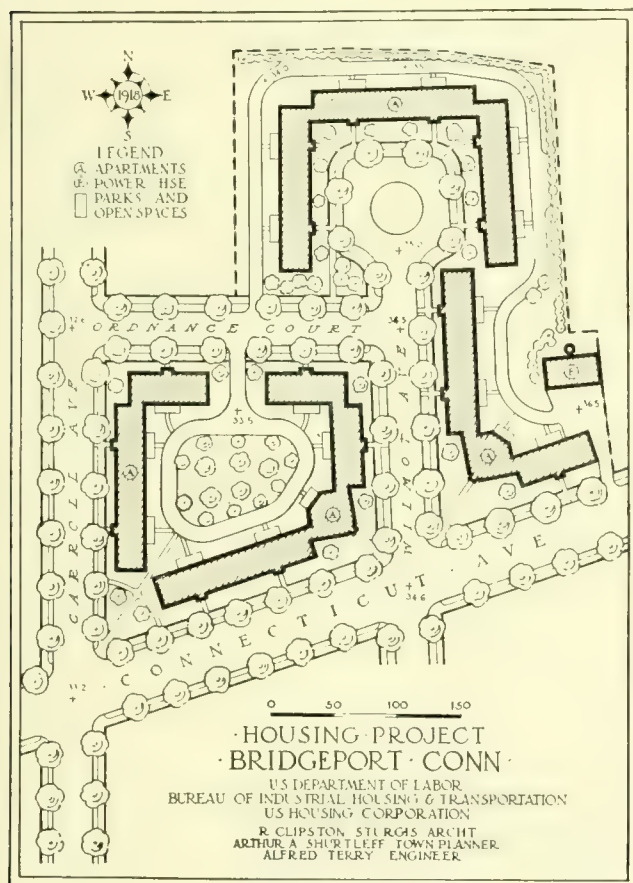
Area planned: 24.72 acres. Housing planned: Semidetached houses, 6 families; row houses, 259 families; semidetached two-flat houses, 28 families; row two-flat houses, 84 families. Total, 377 families.

Housing constructed: Semidetached houses, 6 families; row houses, 185 families; semidetached two-flat houses, 12 families; row two-flat houses, 54 families. Total, 257 families.

(For further information see tables, Chap. IX.)

This tract is immediately adjacent to the plant of the Crane Co., near many other plants in the west central manufacturing district of Bridgeport. The only existing streets were on two of the boundaries. Iranistan Avenue, an asphalt paved thoroughfare of some importance, leads northwest toward street cars, stores, amusements, and most of the factories, and southeast to the neighboring Seaside Park, a fortunate municipal possession of considerable acreage on the waterfront. Across Iranistan Avenue is a residential development, in part of a rather high class, both in detached houses and apartments, and in part of a poor class of wooden three-decker tenements. South Avenue, also paved, leads to the Crane plant and carries a steam freight track from a point a short distance southwest of Iranistan Avenue. Its opposite frontage is occupied by a factory, by back yards, storage yards, etc.

The ground of the site was almost level and just enough above tide water to clear itself of storm water when properly graded and provided with storm sewers. It has a few groups of trees which were carefully utilized in the plan. The types of houses needed here to meet the requirements of the workers were among the smallest and most economical attempted by the corporation, the land was rather high in value because of its convenient location, although by no



CONNECTICUT AVENUE TRACT

a mile and a half from the center of the city and conveniently accessible from many plants in the

¹ For detailed account of plumbing system, see p. 512.

means so costly as the apartment-house sites at Black Rock and Connecticut Avenue. These conditions called for an intensive development mainly with row houses small in scale and on small lots.

In spite of having land as flat as a piece of paper, the designers deliberately chose to meet these requirements in an extremely irregular and picturesque and accidental-seeming plan instead of in something on the order of the Philadelphia grid-iron or a smooth curvilinear system of layout. They followed in this respect a precedent often set in recent European town planning work but seldom boldly attempted here. It is a difficult thing to do with entire artistic success, even if the costs of construction can be kept at all on par with those involved where the same repetition of small units is made in a monotonous way, but where it is as well done as in this case the result is strikingly attractive. So far as the general plan goes, little, if any waste of land or of street and utilities construction can be charged against the irregularities of the plan, and there is no question that in point of picturesque interest, attractiveness, and charm this development takes a very high rank. In the grouping of the houses into rows and into linked-up building masses so irregular that they can hardly be called rows, and in the grouping of these rows and building masses themselves into larger compositions; in the deflections of angle, in the relation of the road and sidewalk lines to the building masses, and apparently in the placing of the trees, an artistically dangerous and difficult thing has been done with notable artistic success. From almost any point of view within the development the houses look well and we may credit this to the unusually careful study given to the problem by both architect and landscape architect and the complete harmony of their work. Had the houses not been given the kind of setting which their design seems to demand; had their picturesque quality been overlooked and the streets laid out with greater regularity of plan, much would have been lost as far as beauty is concerned.

It is interesting to note in this connection that this is one of the few cases where delay in securing the final decision to start on the work enabled the designers to prepare block models of the building masses and study their relations to each other from every point of view in three dimensions, a precaution of the utmost value in getting such results as were here secured.

There are numerous examples at this project of short rows, containing three, four and five houses.

As pointed out elsewhere the special economies of row houses become much more real with longer rows while the difficulties and expenses of access to the rear for garbage, ashes, etc., arise as soon as three houses are joined together in a row. In this case with small low priced houses, the difficulty is met by putting the sunken garbage receptacle at the front and removing the ashes through the front door, so that in passing from a pair of semi-detached houses to a row of three or more there is no extra cost for alley or other rear-access device. There is in fact a reduction of unit cost per house in every respect, offset merely by a certain inconvenience.

The very peculiar arrangement of the two courts on the northwest side of Sims Street requires a word of explanation. The reason for substituting these courts for what would have been the normal arrangement of one row of lots fronting on South Avenue and one on Sims Street, was the occupation of South Avenue by a freight track and an unattractive outlook across the street except near Iranistan Avenue, so that houses fronting on South Street would have seemed to be "left out."

One can not help but be impressed by the similarity in feeling between the houses in the Crane tract and some of the old towns familiar to those who have motored through rural England. The old houses have, of course, the advantage of time and the elements. The Crane houses have, and will have, for years to come, a new look. Nevertheless, the Crane houses have an air of domesticity—a look of comfort—due to several causes. In the first place they are comparatively low—they seem to cling to the ground and to each other in neighborliness; they have a look of solidity for their materials are of a permanent nature, being brick with slate roofs. They are pleasant to the eye, being of a soft red tone and they appeal to good taste because of their simple long lines, and the delicate moldings of doorways and cornices and their general proportions. There is a distinct similarity in the houses, yet nowhere is the view of any row monotonous.

An examination of the interiors reveals a straightforward comfortable plan, diversified in layout so as to suit the convenience of almost any small family.

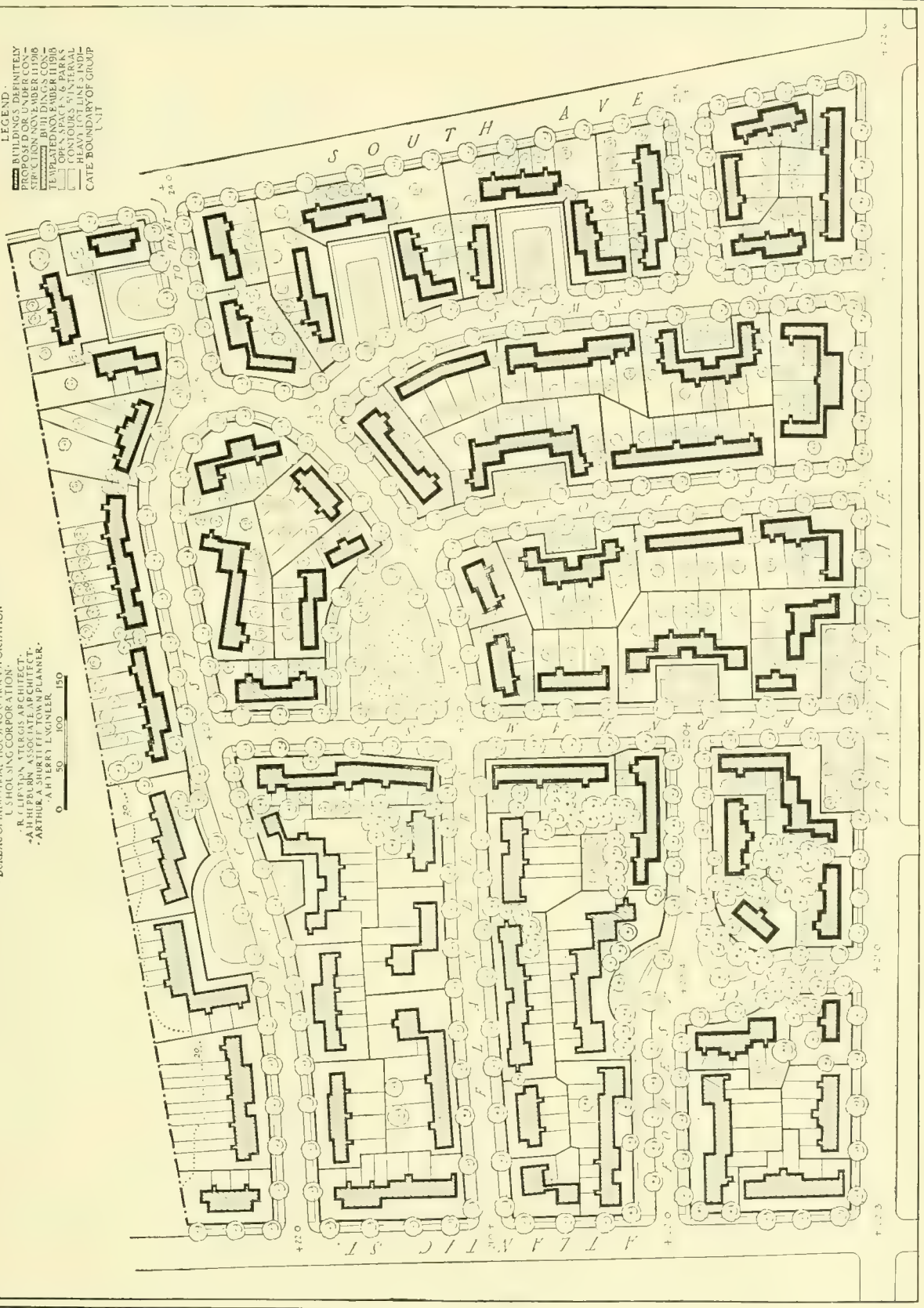
The absence of furnaces is notable. The heating is from the kitchen stove, sometimes supplemented by a stove in some other room, trusting to the circulation from them to heat sufficiently the rest of the house; but the houses are so planned that at reasonable cost furnaces can be provided in case the occupants want to pay the price.

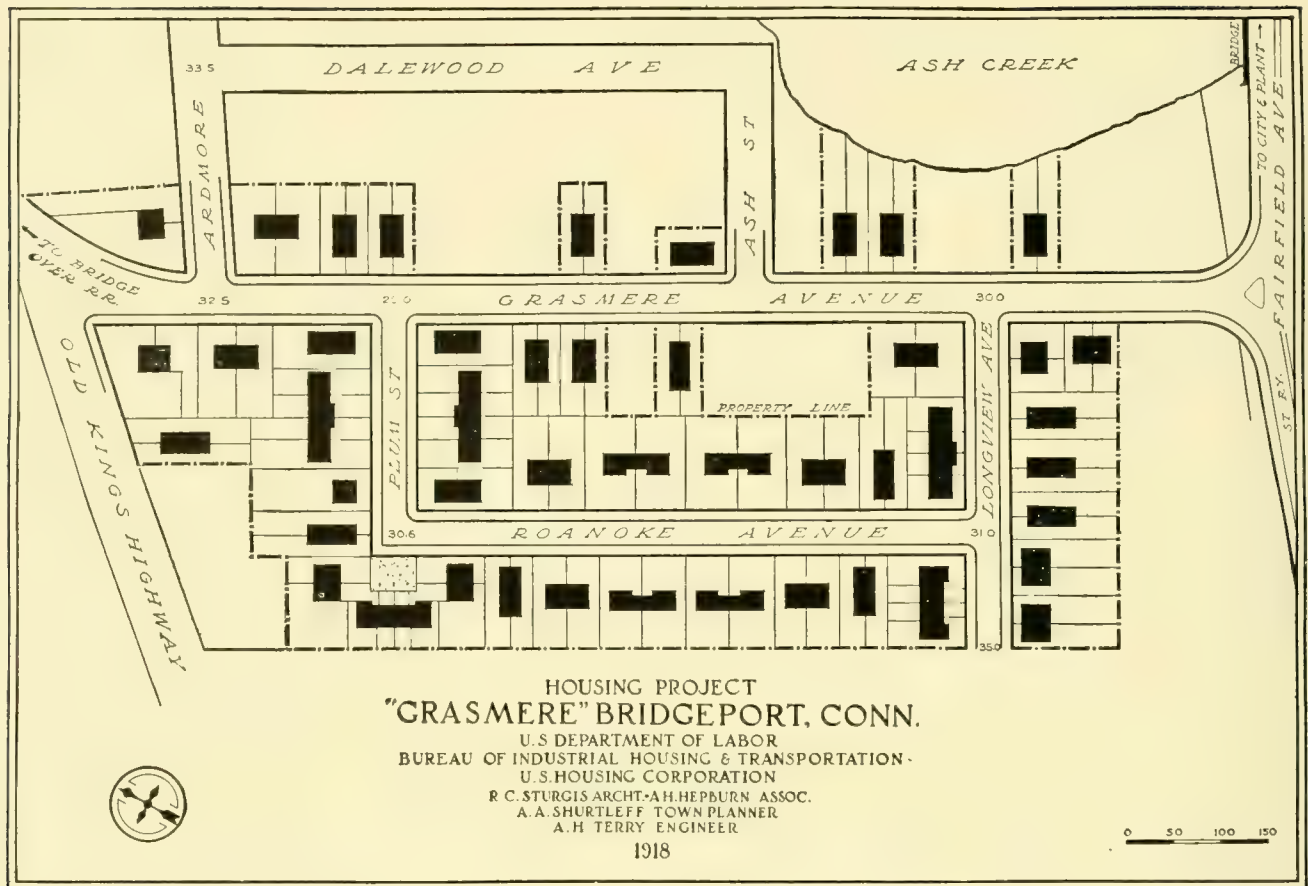


LEGEND -
BUILT BUILDINGS DEFINITELY
PROPOSED FOR CONSTRUCTION
SPECIFIED NOVEMBER 11, 1936
TEMPORARY BUILDINGS CON-
TEMPLATED NOVEMBER 11, 1936
CONTOURS 5' INTERVAL
HEAVY LOT LINE 3' IND-
ICATE BOUNDARY OF GROUP
UNIT

CRANE TRACT
HOUSING PROJECT AT
BRIDGEPORT, CONNECTICUT.
BUREAU OF INDUSTRIAL HOUSING CORPORATION.
R. CLIFTON ATTERGIS ARCHITECT.
ARTHUR H. HARRIS ASSOCIATE ARCHITECT.
ARTHUR H. HARRIS ASSOCIATE PLANNER.
ARTHUR H. HARRIS ENGINEER.

0 50 100 150





Grasmere Tract.

Area planned: 9.77 acres. Housing planned and constructed:
 Detached houses, 1 family; semidetached houses, 40 families,
 row houses, 20 families; detached two-flat houses, 40 families.
 Total, 101 families.

(For further information see tables, Chap. IX.)

This site is just outside the western city limits of Bridgeport in the town of Fairfield, and is just beyond the end of the single fare and frequent service zone of the street railway and end of the jitney service. It is accessible to the industries in the western part of the city and relatively low in land value. The streets were already platted. Grasmere Avenue, which leads toward an attractive development of the Bridgeport Housing Co., beyond the railroad was partly improved and had numerous houses on it. The corporation acquired vacant lots among these houses in addition to the entire frontage on Roanoke Avenue and Plum Street, which were wholly unimproved and vacant.

The almost perfectly symmetrical grouping on Plum Street is interesting and successful, especially as seen looking down from the Grasmere Avenue end toward the wide axial mass formed by a row of

four houses. The house selected to terminate the vista of Plum Street at the Grasmere Avenue end and that terminating Roanoke Avenue at the northwest end are not of a size and shape to do so quite successfully, but after the narrowing of the vista by the growth of street trees they should be more effective and in any case the vistas are pleasanter than one which does not fall squarely on any building mass, but just off one corner of a building as at the southeast end of Roanoke Avenue. As at other projects the tendency has been to overdo the desirable variation of setback, and to enlarge the front yards too much at the expense of the back, except on Longview Avenue where the steep hillside forced the houses forward fairly close to the street.

It is interesting to note that one of the incidental advantages expected from building on the scattered lots among the other houses in Grasmere Avenue failed to result. It was thought that the addition of our reasonably good looking and substantial brick houses would improve the appearance of the street and make it much more attractive as an approach to the bulk of our holdings. But owing to the disharmony between our brick houses and the previous

wooden ones not only is Grasmere Avenue much less attractive than Plum Street and Roanoke and Longview Avenues, but it is less attractive than before we built and probably less agreeable than it would have been if its blanks had been filled up by wooden houses of inferior architecture but not so contentious with their neighbors. These houses are discussed in more detail with those at Mill Green.

Mill Green Tract.

Area planned: 20.23 acres. Housing planned and constructed: Detached houses, 4 families; semidetached houses, 56 families; row houses, 41 families; detached two-flat houses, 54 families; semidetached two-flat houses, 52 families. Total, 207 families. (For further information see tables, Chap. IX.)

This site in the northeast part of the city, within one-half mile of the great Remington plant, within walking distance of several other plants, and within a mile and a half by trolley of the center of the city, faces upon Mill Green, a long, narrow common in the old Boston post road. It is composed of three adjacent parcels known as the old Mill Green site, the Judson site, and Cemetery Extension site. (In the tables the first two are grouped as Mill Green, and the last tabulated separately.)

It is of comparatively gentle topography except for abrupt outcropping ledges on the northerly part of the Judson site, but the parcels are either irregular in shape or of awkward dimensions for subdivision. Except to the east of Asylum Avenue there were numerous good trees to which the plan was carefully adjusted. The lotting is irregular but normally approximates 90 feet in depth except for the small row houses, which have extremely shallow lots, in some cases about 55 feet.

The general appearance, especially of the Mill Green and Judson sites, is picturesque and attractive. Except in the rectangular portion east of Asylum Street there has been little reliance on systematic variations of setback in house grouping. There are a few cases of marked variations in setback, as in two instances on Boston Avenue where a pair of detached houses is set back 30 feet from the general building line, bringing its front in line with the back wall of the adjacent detached house.

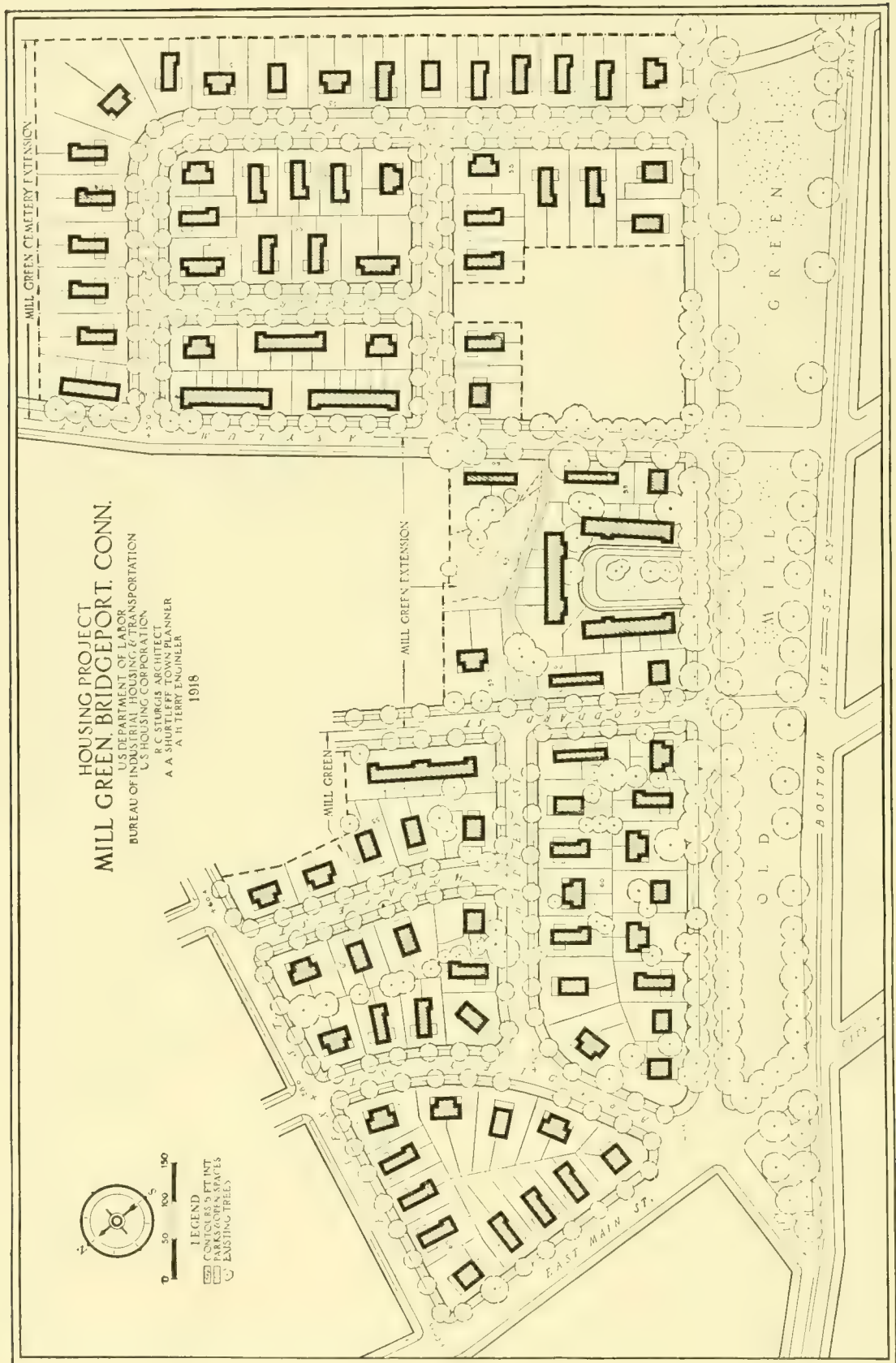
These extreme setbacks, for which large existing trees in the front yards were the special motive, have the effect not of mere variations in the general building line of the street but of distinct courts. They contribute to the interesting and attractive appearance of the whole layout, but it remains to

be determined whether there is not a reduction in value of the recessed houses offsetting the increases in value for the other houses. The grouping around the junction of Bradley and Hadley Streets is agreeable, although the composition might have been still more agreeable if the side spaces between buildings had been reduced sufficiently to house at least two more families on the same area.

In the block between Goddard Avenue and Asylum Street the normal method of subdivision would have been to extend Hadley Street right through, leaving one row of lots north of it and two south. But because of rock outcrops the cost of constructing this extension of Hadley Street would have been more than the value of the limited amount of additional frontage developed by it, especially as the lots to the north would have been very rocky. Under these circumstances the most economical plan for using the interior of the block appeared to be a relatively deep court opening off Boston Avenue flanked by a row of five houses on either side with another row of five houses at the end, the rough ground further north being reserved as a small local park. The type of "court" here used, much more common in English developments than in this country, is attractive in appearance as compared with an ordinary street lined with the same type of row houses, and in a case like this has peculiar economic advantages.

East of Asylum Street is a late addition to the tract forced by the shape of the land into a rather commonplace rectangular development. Standish Street has a definitely chosen and placed vista point, but the other vista ends are not satisfactory. It is noticeable that the vista down Colony or Plymouth Street to the bend connecting them would be very much more agreeable if the buildings on the outside of the bend were closer together or had longer frontages, or both, and more positively suggested the bend as seen from a distance.

The houses on both Grasmere and Mill Green tracts are of brick, with slate roofs, the effect being one of stability and unity of color. One is impressed not alone by their characteristics but also by the satisfactory grouping and the pleasant relation of one house to another in the views one gets of the street vistas. The details of millwork are similar and all architecturally refined. The developments in their entirety are most pleasing while individually the buildings are equally so. The plan types are partly from corporation standards.



Particular attention is called to the manner by which access is gained to the cellar in some of the houses. In these cases there is at the front of the house a lattice door opening upon a large landing of the stairs which lead from the kitchen to the cellar, permitting ashes and garbage to be conveniently removed.

A noticeable feature of some of the houses at Grasmere is the unsymmetrical spacing of windows in elevations otherwise symmetrical. It would seem that some alteration of the plans of the houses could have been made in order to avoid this.

Many of the houses have very small porches—almost too small for comfort—and though larger porches might cost a little more, yet, as a rule they return their investment in rent. The details, too, of the porches are somewhat too delicate in design.

Nearly all of the houses of the Grasmere site are well worked out from the corporation's types, but in a few cases where side entrances occur either the chimneys have been placed in unfortunate positions or else the houses are too small, there being insufficient headroom at the entrances under the main stairs.

At Mill Green and Cemetery Extension the faults mentioned in connection with Grasmere are absent. At both of these sites the houses are simple and straightforward and no attempt has been made to force too much into them either on plan or elevation. The result therefore is more satisfactory. The plan types used are from corporation standards, in many cases the same as at other Bridgeport sites. They are very well worked out.

In spite of such criticisms as have been made, the Bridgeport developments are peculiarly attractive, and the fact that they are all of brick makes them especially worthy of future study with a view to determining their true worth as a marketable real estate development.

Temporary Flats. (Project 102a.)

CEMETERY SITE.

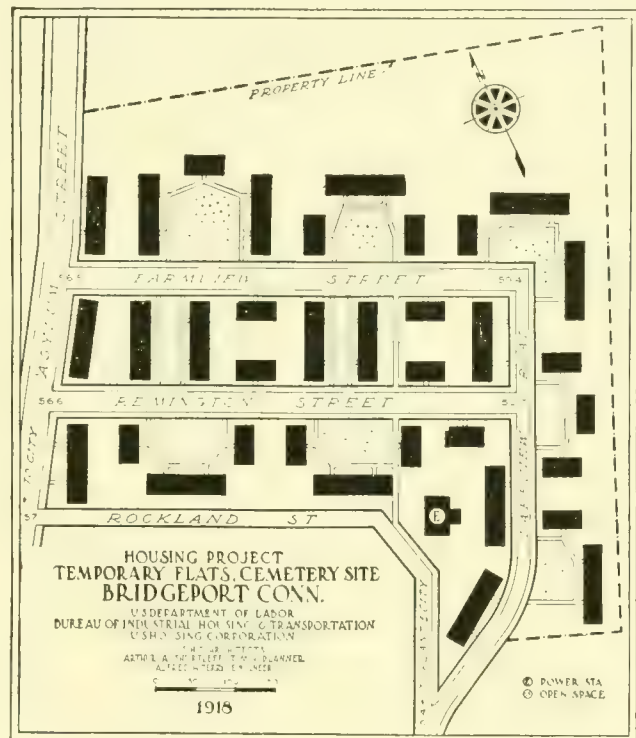
Area planned: 8.69 acres. Housing planned: Apartment houses, 212 families.

HILLTOP SITE.

Area planned: 8.45 acres. Housing planned: Apartment houses, 188 families.

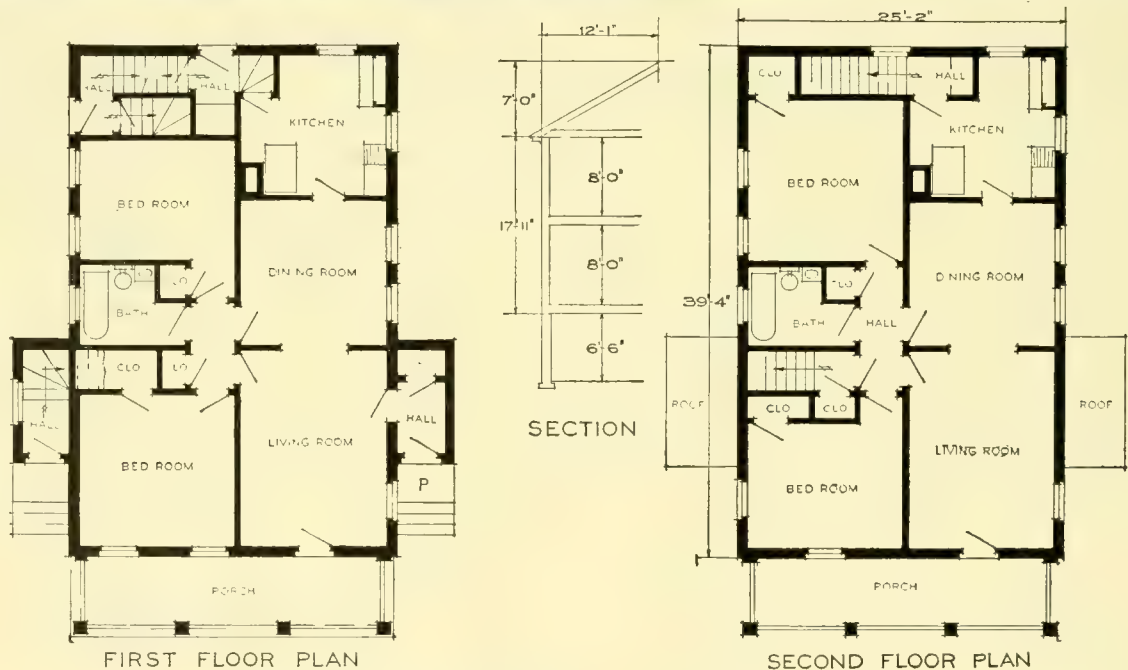
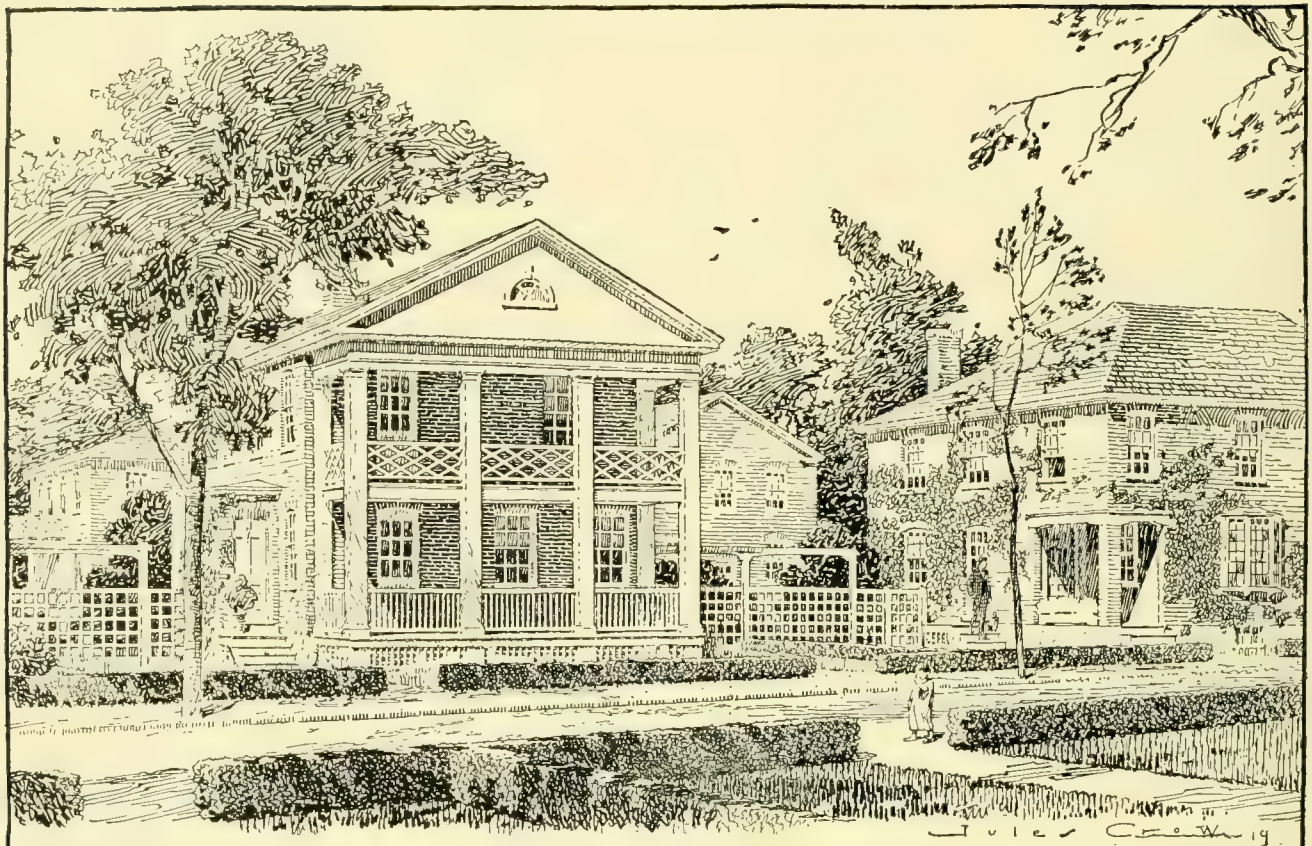
(Projects discontinued. For further information see tables, Chap. IX.)

These two projects for temporary housing were to meet a very serious need for a largely increased



force of employees at the Remington plant. Only preliminary work had been done at the time of the armistice and the work was at once canceled. Only one house type was contemplated, a 2-story, 2-room-deep building with 4 families to a unit.





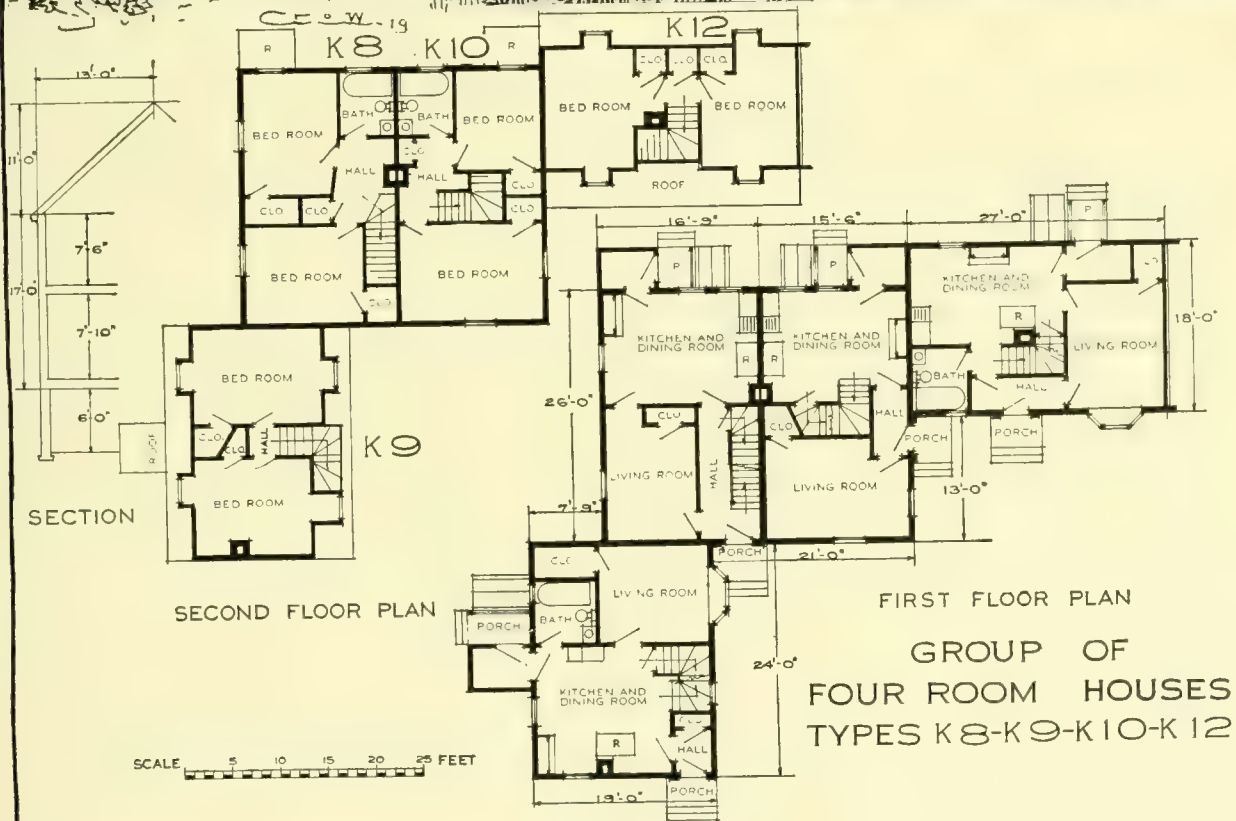
TWO FLAT HOUSE TYPE H 2

SCALE 5 10 15 20 25 FEET

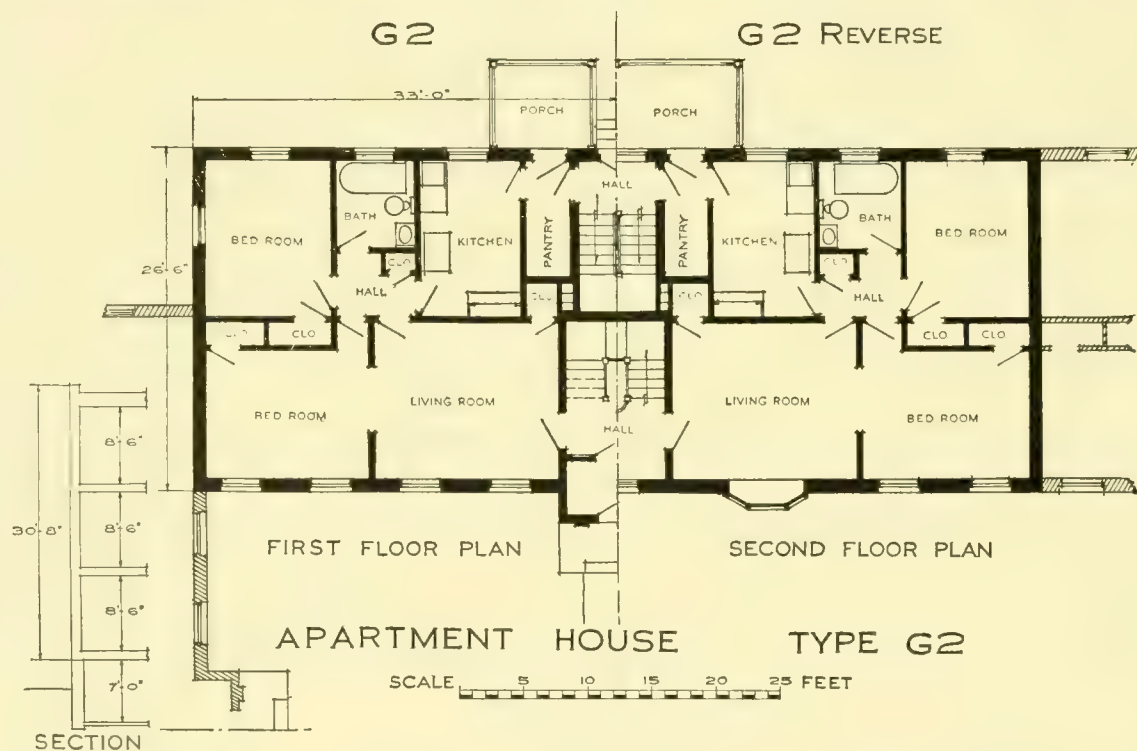
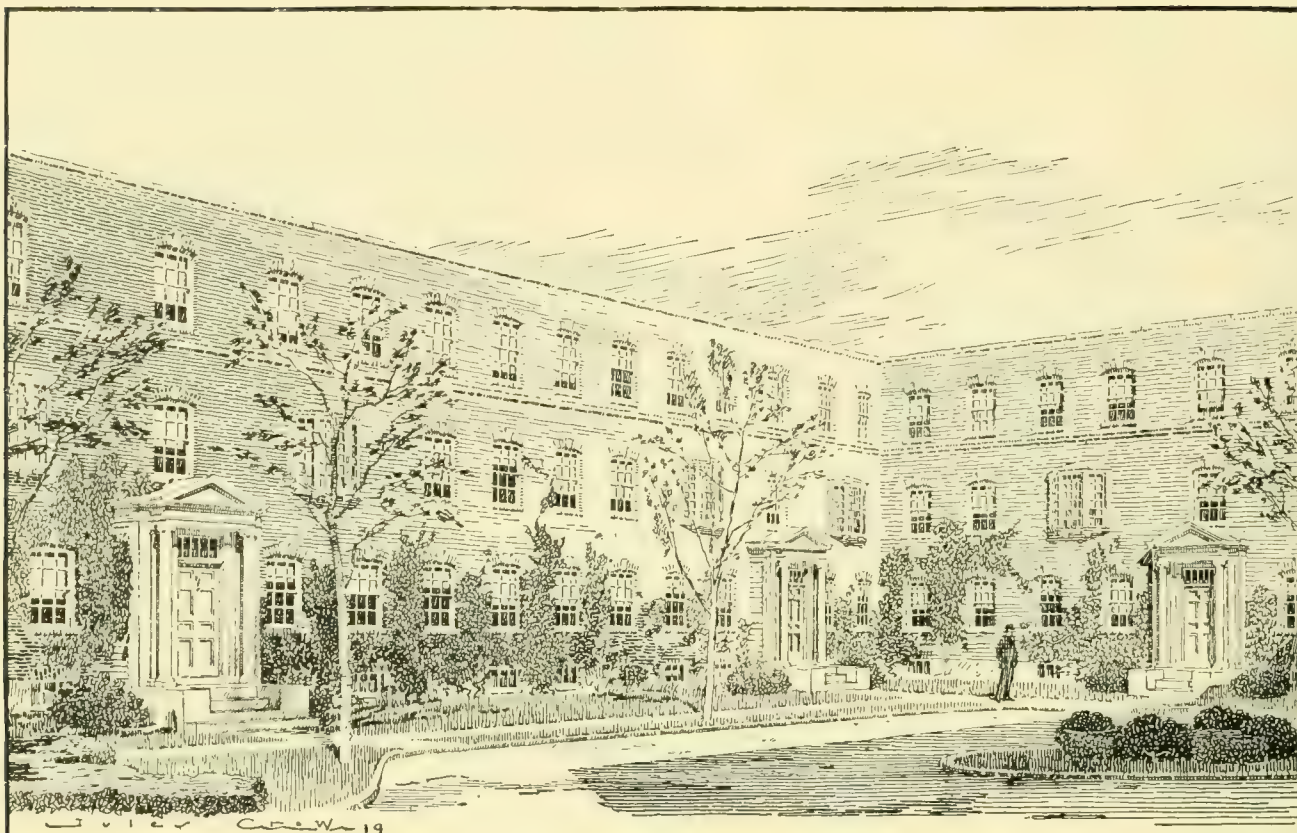
UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BRIDGEPORT CONN

ARCHITECT

R CLIPSTON STURGIS

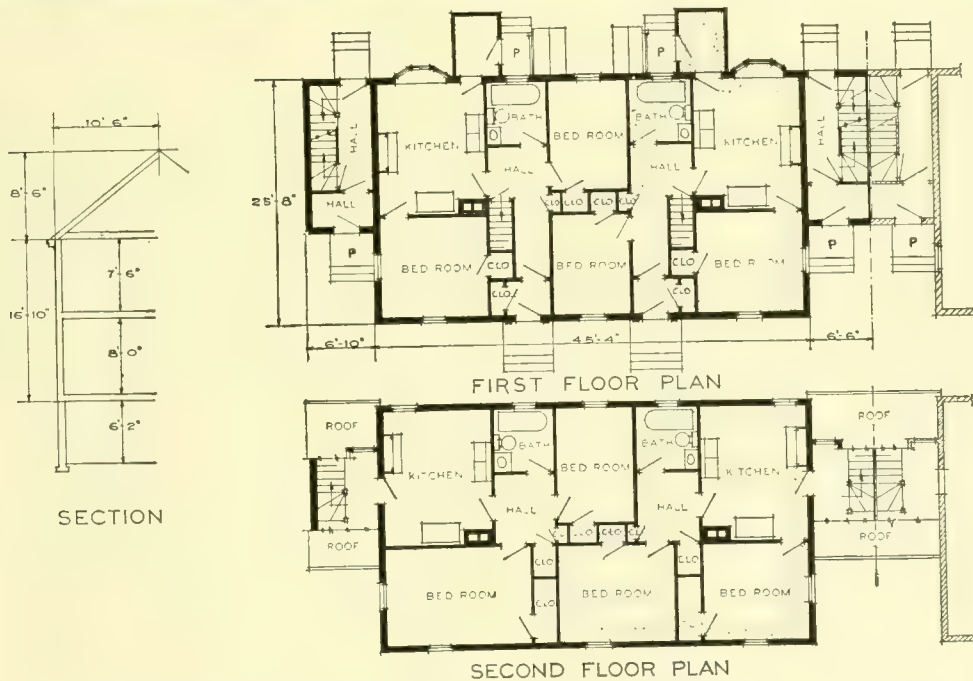
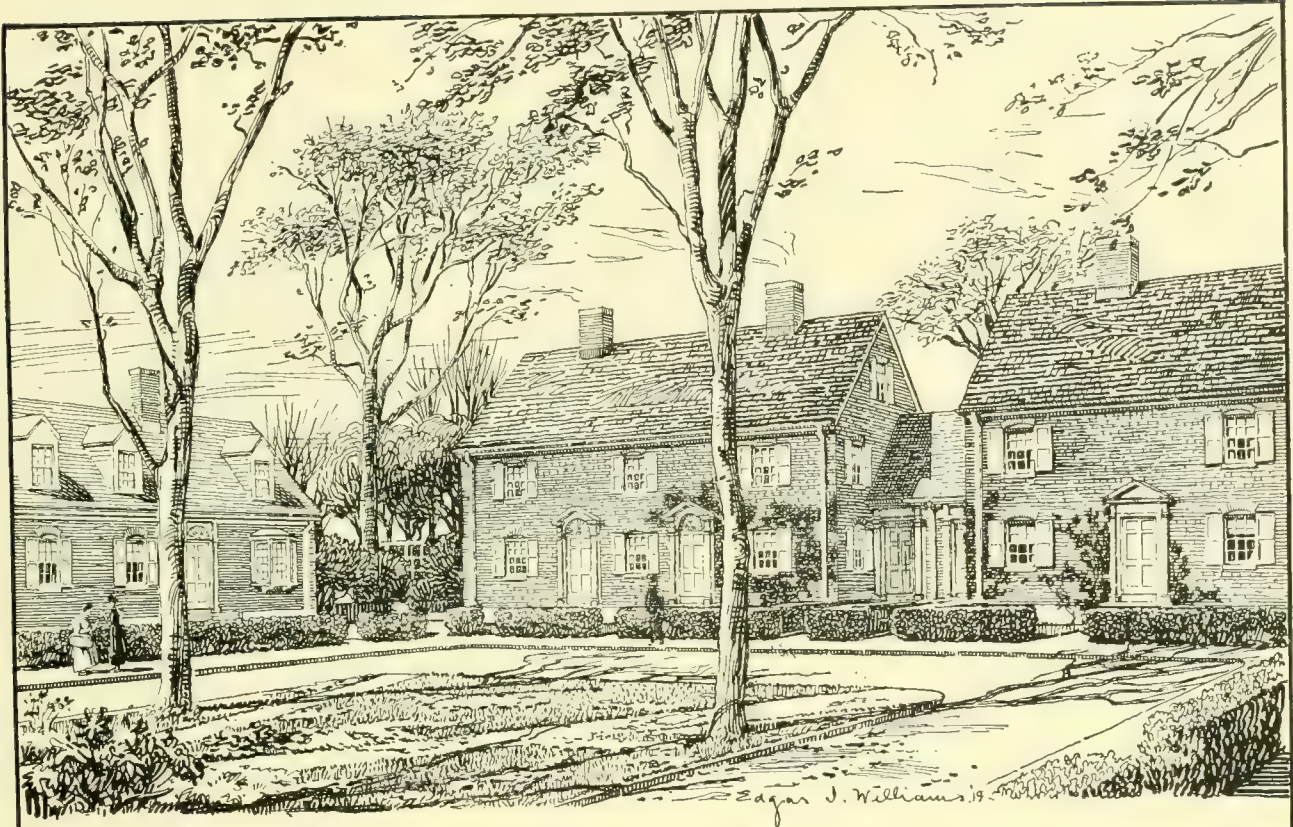


UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BRIDGEPORT CONN
ASSOCIATE ARCHITECTS
R CLIPSTON STURGIS A H HEPBURN



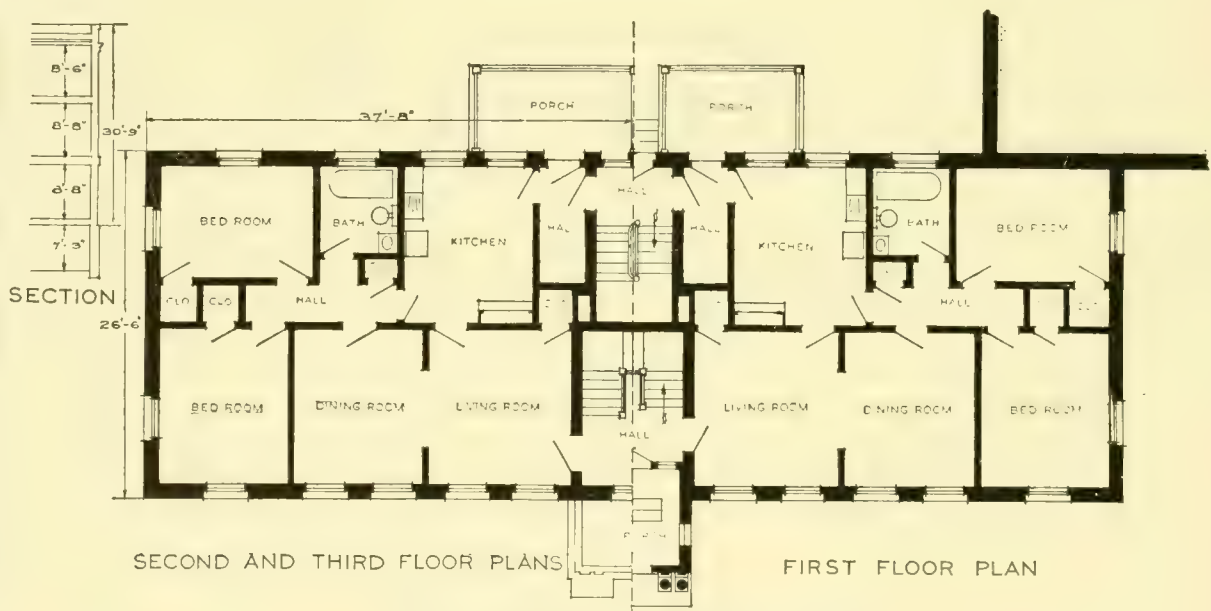
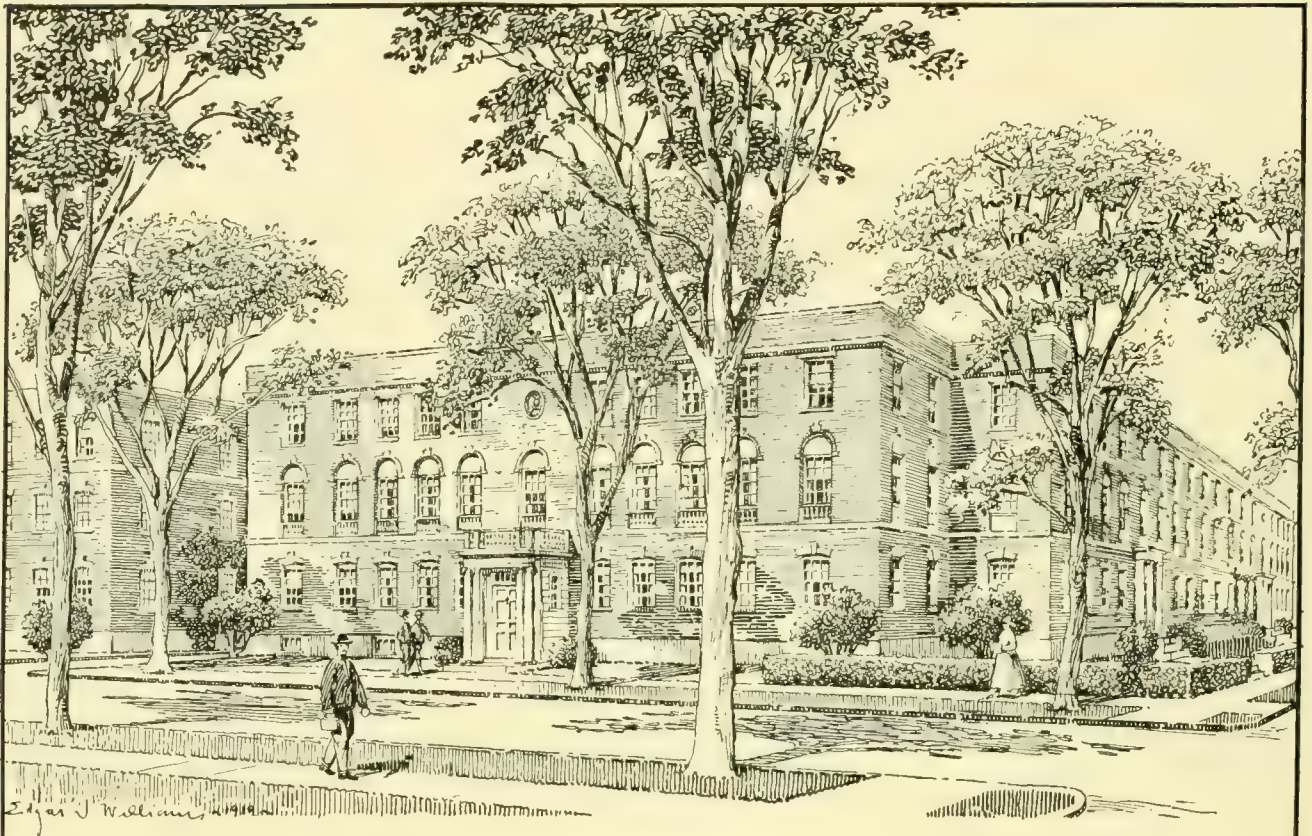
UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BRIDGEPORT CONN

ARCHITECT R CLIPSTON STURGIS



SEMI-DETACHED TWO FLAT HOUSES TYPES H 5

UNITED STATES HOUSING CORPORATION
 DEVELOPMENT AT BRIDGEPORT CONN
 ASSOCIATE ARCHITECTS
 R CLIPSTON STURGIS A H HEPBURN

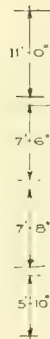


UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BRIDGEPORT CONN

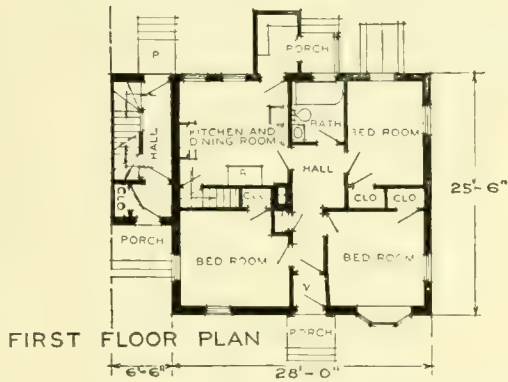
ARCHITECT R CLIPSTON STURGIS



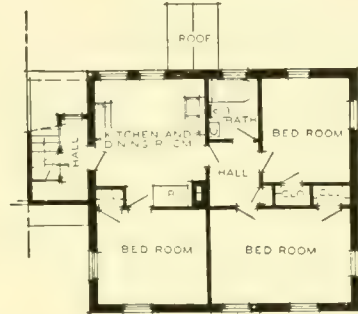
FRONT ELEVATION



SIDE ELEVATION



FIRST FLOOR PLAN



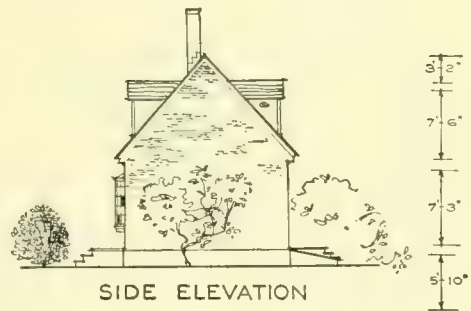
SECOND FLOOR PLAN

TWO FLAT HOUSE

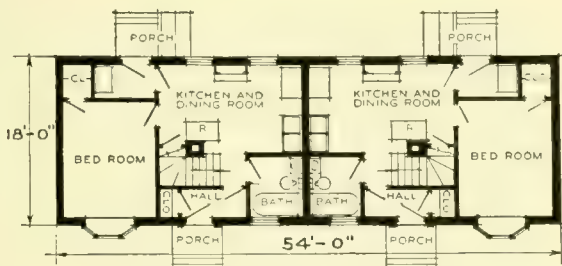
TYPE H6



FRONT ELEVATION



SIDE ELEVATION



FIRST FLOOR PLAN



SECOND FLOOR PLAN

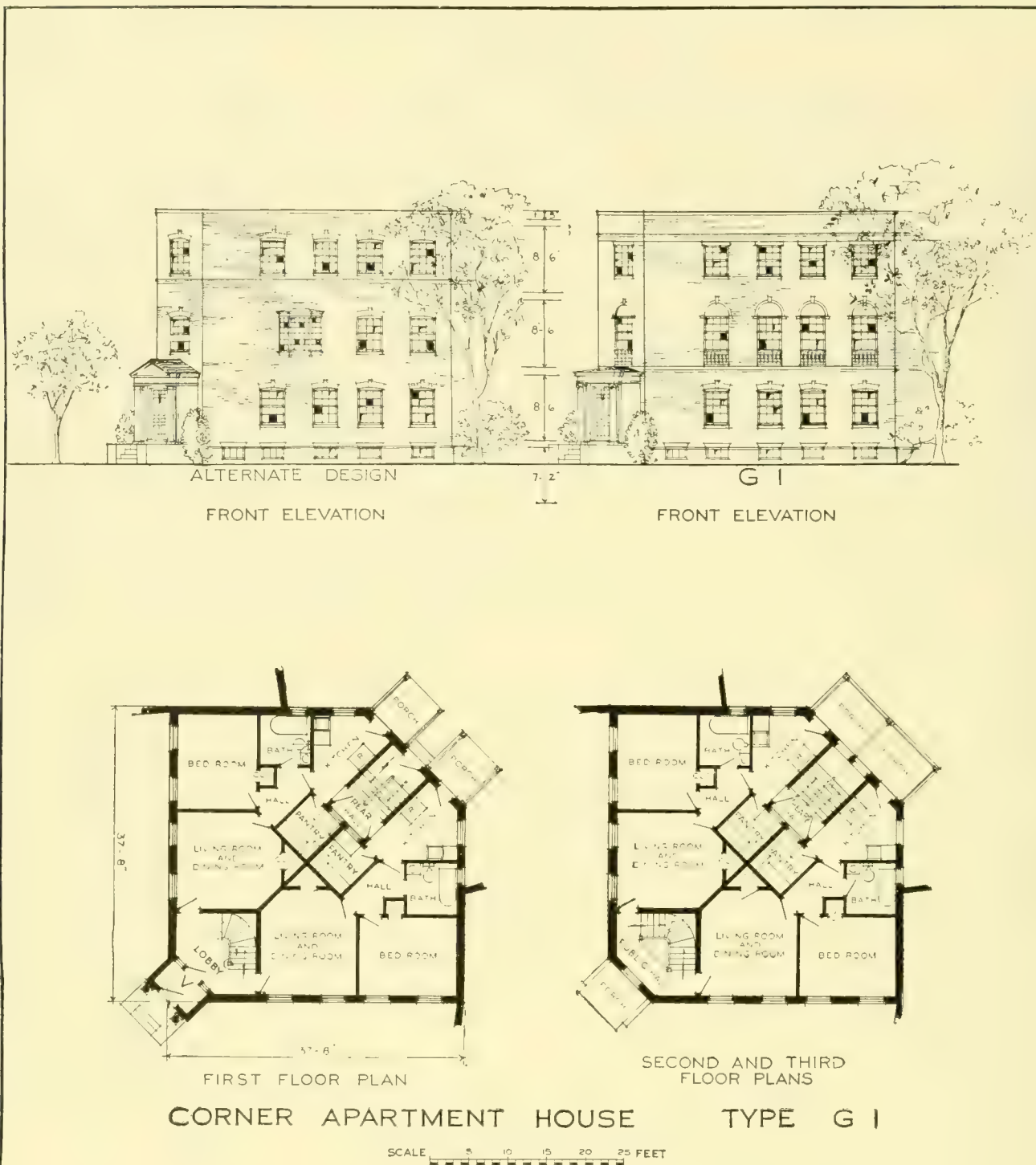
FIVE ROOM SEMI-DETACHED HOUSES TYPES K 12



UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BRIDGEPORT CONN
ASSOCIATE ARCHITECTS

R CLIPSTON STURGIS

A H HEPBURN



UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT BRIDGEPORT CONN

ARCHITECT R CLIPSTON STURGIS

BUTLER, PA. (PROJECT NO. 456).

Area planned: 21.46 acres. Housing planned: Detached houses, 29 families; semidetached houses, 138 families; total, 167 families.

(Project discontinued. For further information see tables, Chap. IX.)

Butler is 30 miles north of Pittsburgh, in the valley of Connoquenessing Creek and extending up the steep and irregular slopes north and south of the stream. Its population in 1910 was about 11,000; in 1917 about 29,000, including many foreign born. Two industries asked the Housing Corporation for relief: Spang & Co., doing 97 per cent war work, making 700 shells daily, with 1,100 employees, and hoping to make 1,500 shells daily if help were available; and the Standard Steel Car Co. doing 80 per cent war work, with a recent order for 10,000 cars, employing 5,600 workers and needing 1,500 more. However, shells were rated by the War Department as much more urgent than railway material and after extensive investigation of the very few feasible sites it was decided to concentrate on a single site lying on the less steep upper slopes of the valley immediately south of the Spang plant.

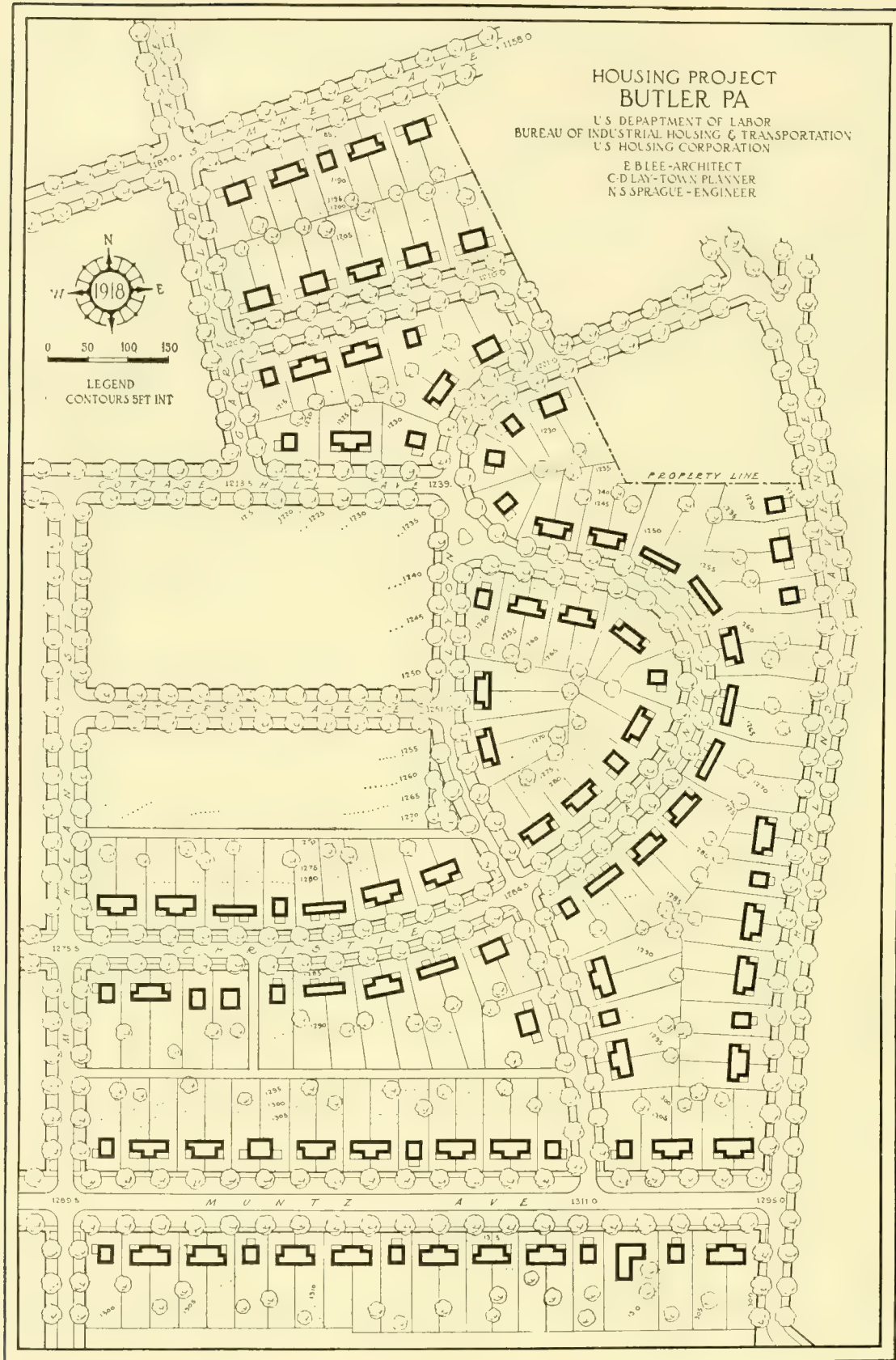
The site chosen was in the southern part of the city within a quarter of a mile from the Spang Co.'s plant and about 200 feet above it, and about a mile and a half from the plant of the Standard Steel Car Co. Schools and stores, churches and amusements, were within a half mile to the north. In this project no public grounds were included, the whole tract being developed with houses. This was because of lack of land for public purposes within the tract, and because of the probability that in the future other land near by, which is unfit for building because of the rough topography, would be developed as park areas. The site lay on an irregular hillside, that in some districts would have been considered almost prohibitively steep, but which was in this generally rugged region a very satisfactory building site.

The tract had already been laid out in a rectangular system of streets with little regard to the topography, but not all of them had been constructed. Our street arrangement changed that previously plotted to get better gradients in the roads and less steep and inaccessible lots. Christie Avenue, which was partly built up on its western end, was radically changed, so as to go down the hill on a reverse curve at a reasonable gradient, connecting with the former streets again at the east boundary of the property. From Muntz Avenue to Christie

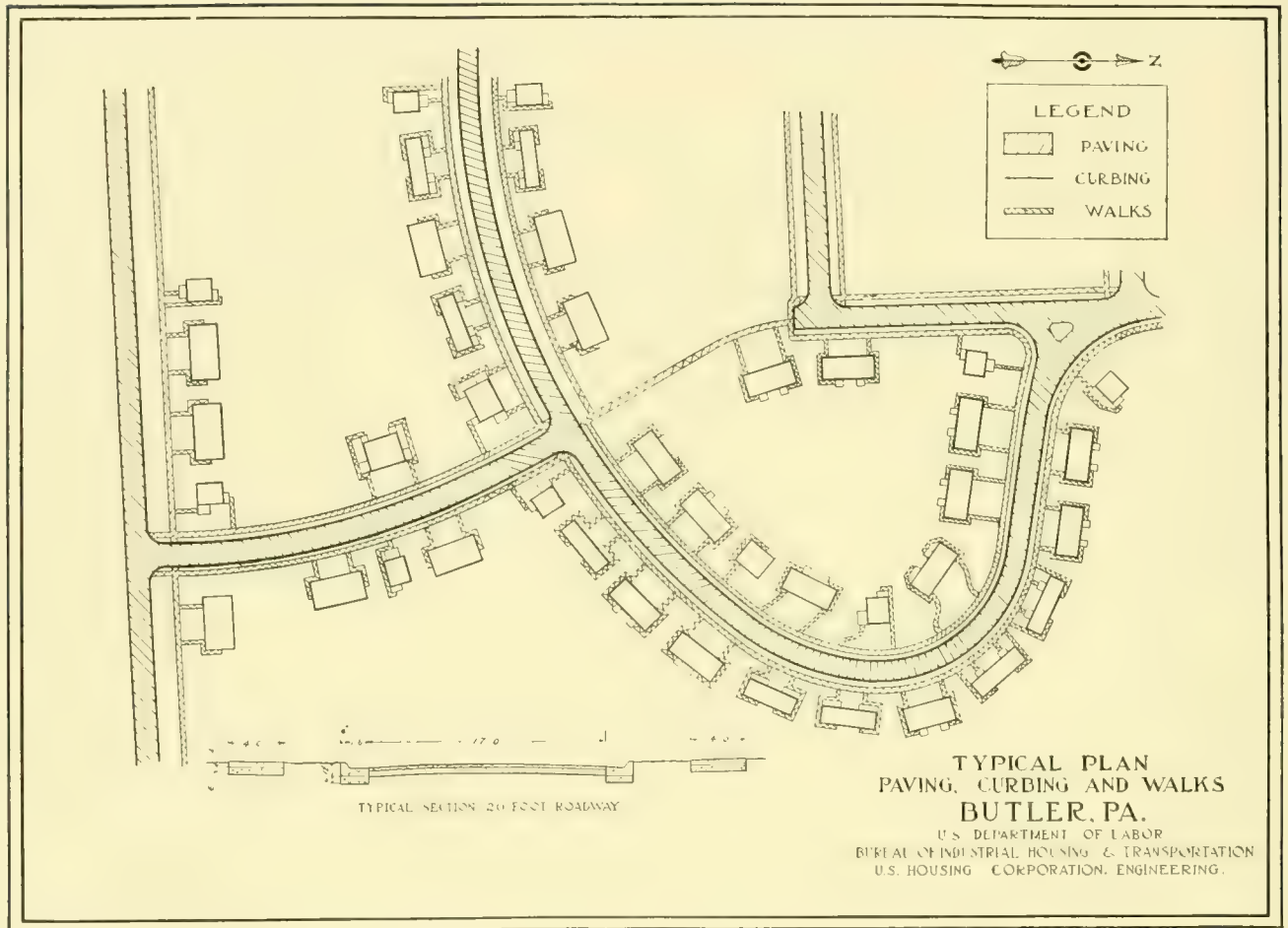
Avenue a slightly curving street was easy to lay out. From Christie Avenue to Patterson Avenue, however, the slope was very steep for a street, so we carried the line of traffic with a path only, at least for the present, at a gradient of 17 per cent, and required such little local wheeled traffic as there might be between these points to go around by easier gradients via Christie Avenue. The roadway of Christie Avenue, where it turns sharply on a steep gradient, is not evenly crowned, but is "banked," the highest part of the crown being within 5 feet of the gutter of the downhill side of the street in order to minimize the danger of sideways slip to traffic.

Most of the streets were thus necessarily treated as sidehill streets, with the lots on one side sloping down from the street grade, and on the other side rising rather steeply. The grouping of the houses had to be designed to take the best advantage of the grades. On the downhill sides of the streets the houses were set sometimes as close as 12 feet to the street lines, the floor grades being at an elevation high enough to permit a slight slope from the house down to the sidewalk. At the rear of these houses the ground was sloped down as quickly as feasible to meet the natural grade. On the uphill sides of these streets, however, the opposite of this treatment was followed. Here the houses were set as far as 28 or 30 feet back from the street line, in order to permit the placing of the entrance walks and steps at reasonable slopes, and to avoid the unstable appearance of a house set too near the street on an excessive slope.

Where semidetached houses were on such steep lots that it was impossible to approach them except by steps, it made a better looking and less steep approach to run one common flight of steps directly toward the middle of the double building, and then to turn the paths right and left, with more steps to each private house entrance. Where the lots were very steep and the house floor as much as 10 feet above the street, we built the approach paths in this way. Where the lot was not very steep, however, we built two independent paths to the street, preferring to make some sacrifice in appearance and expense to avoid the differences so likely to arise from the use, cleaning, and repair of walks serving two families in common.







CHARLESTON, S. C. (PROJECT NO. 565).

Area planned: 30.74 acres. Housing planned: Detached houses, 136 families; apartment houses, 20 families; total, 156 families; 30 single workers in dormitories.

(Project discontinued. For further information see tables, Chap. IX.)

The city of Charleston, S. C., located at the junction of the Ashley and Cooper Rivers, had a population of 59,000 in 1910, which had risen to about 100,000 in 1918, a great number being colored. At this time the rapid growth of population, including the soldiers stationed at Sullivan Island near Fort Moultrie, the marines and workmen at the navy yard, the soldiers and workmen at the embarkation camp, and their dependents, had utilized practically all the available housing and had outrun the development of the local railroad lines and trolleys. The navy yard is located on the Cooper River about 6 miles north of Charleston. Next to the navy yard is a large naval camp, while 3 miles farther north up the river are the Army embarkation camp and docks. There were about 4,500 employees—almost all white—in the navy yard in May, 1918, including about 1,100 women in the clothing factory. A considerable part of these workers might be regarded as permanent since the navy yard was undoubtedly to be maintained after the war. New construction in the yard was in progress and the Government had appropriated money for a 40-foot channel in Charleston Harbor.

Some private speculative building of houses had been carried out near the navy yard, but it was utterly insufficient, and most of it was poor and expensive. Since early in the war, transportation between the navy yard and Charleston, either by railroad or by trolley, was insufficient. The Navy had been paying for a railroad train which carried about 900 women back and forth from Charleston. The trolley company was eventually helped by the Housing Corporation to get 16 more cars. It was proposed also that the clothing factory be moved to Charleston to relieve the transportation difficulty, but this suggestion was not acted on.

In any case there was great need of additional reasonably good housing, and so long as this housing did not exceed the predictable postwar demand it was better to build it near the navy yard. Up to August, 1918, the housing needs of other navy yards in the country were so much more pressing that no definite housing plans for Charleston were undertaken. By that time, however, the need at Charles-

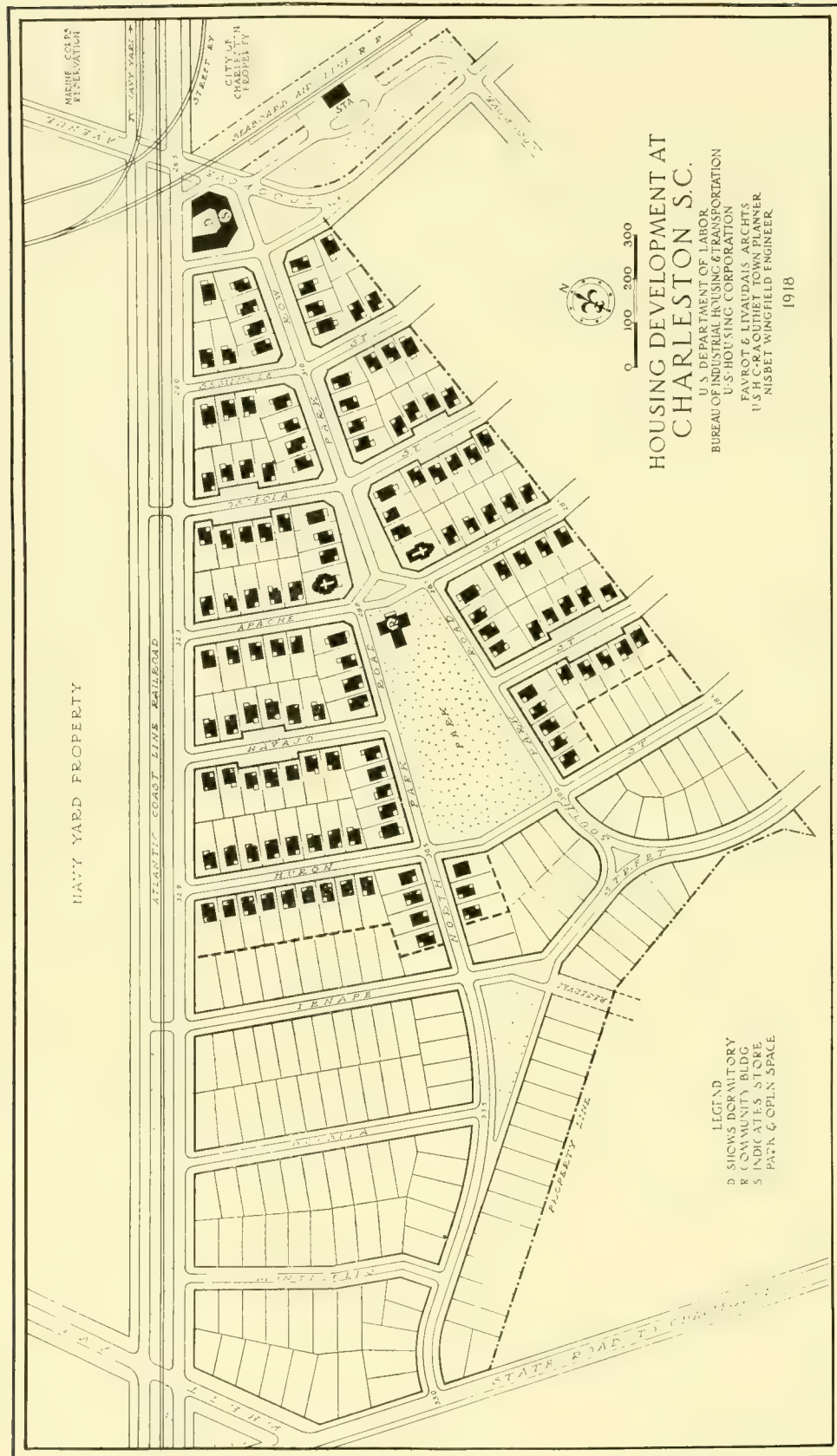
ton was so great that it was determined to proceed at once.

The city of Charleston offered to the Housing Corporation a tract of land adjacent to the navy yard—the best piece of land available—for a nominal price, about a tenth of that for which similar land was selling. This land is gently rolling, about 30 feet on an average above high tide, covered over most of its area with second-growth yellow pine 10 to 12 inches in diameter, interspersed with many seedling oaks from 10 to 12 feet high. The soil is sand, overlying marl 15 or 20 feet below. A water main was in the northern bounding street, a sewer 300 feet farther away, and electricity close at hand. There are no schools, churches, or fire protection within reasonable distance of the site.

To meet the climatic conditions and the requirements of the people, a bungalow type of house was planned, the same as that decided on for the projects at New Orleans and at Pensacola. These were all detached houses, as there was a strong local prejudice against the semidetached type. These bungalows covered a greater ground area than two-story houses would have done, but the size of the lots was not proportionally increased, because we allowed a minimum clearance between buildings of 14 feet instead of 16 feet on account of the low eave lines.

The street system as planned was a simple meeting of the existing conditions. A main avenue leads from the community building on the park toward the apartment houses and railroad station, and so to the navy yard. The residential streets purposely do not invite through traffic, though they connect with existing streets. On some of them the houses are set back to form groups surrounding a little quiet open space. An unusual feature of the plan is the cutting back of the lot corners along the main avenue, for greater amplitude and interest.

In order to save as many of the existing trees as possible, shade being especially valuable, the gravel sidewalks were planned to be set practically on the existing surface in most places, any difference between sidewalk and road being taken up in the planting strips. The planting strips,



too, were held as near the natural surface as possible, and trees saved in them wherever this could be done. No formally arranged street trees were planned for, the scheme being to fill in the open spaces among existing trees and produce ultimately the effect of houses standing in an open woodland.

Owing to the considerable rainfall, and occasional torrential rains, the surface water could not economically be carried off by underground pipes. We planned gutters in the planting strips, becoming ditches where the predictable flow of water warranted it, carrying the water finally to the existing

open ditch on the southeastern boundary. We believed the soil was porous enough to make it easy to avoid mosquito nuisance from standing puddles in the ditches on the necessarily flat gradients. We used vitrified pipes to carry the water from the ditches under the sidewalks where necessary. This last is not a scheme to be recommended for its beauty, nor, in a cold climate, for its practicability.

Bids had been taken on this project and work was about to start when the end of the war caused its complete cancellation. For the permanent uses of the navy yard it is possible that the construction may at some future time be taken up again.

2

CHARLESTON, W. VA. (PROJECT NO. 18).

Area planned: 16.28 acres. Housing planned: Detached houses, 47 families; semidetached houses, 40 families; total, 87 families.
Housing constructed: Detached houses, 45 families; semidetached houses, 40 families. Total, 85 families.

(For further information see tables, Chap. IX.)

The city of Charleston, W. Va., on the north bank of the Kanawha River, had grown from a population of about 11,000 in 1900 to about 40,000 people in 1918. This industrial growth, due to natural resources of coal, oil, gas, and clay and excellent transportation facilities, while much stimulated by war conditions, seemed likely to be for the most part permanent. The town had spread along the river, the manufacturing plants on the lower river bank land, the dwellings for the most part on the broken higher land back from the stream.

South Charleston, on the south bank of the river and $5\frac{1}{2}$ miles west of the business center of Charleston, had in 1915 47 houses, in 1918 there were about 2,000 inhabitants, and the town was reasonably provided with schools and stores.

The Naval Ordnance Works, consisting of a naval projectile plant, a naval gun-forging plant, and a Government armor plant, being under erection early in 1918, and it being evident that there would not be by any means sufficient housing for its prospective employees, the Navy Department called upon the Housing Corporation to investigate and to expend such sums as might properly be allotted for housing in connection with this plant. The Navy Department offered without cost a perpetual lease of a tract of land of 16.3 acres adjacent to the ordnance plant on the river bank.

Though this tract was open to the objections that it was on land which at some future time would naturally be devoted to manufacturing rather than to residential uses, and that it was near the plant, which was bound to be to some extent noisy and smoky, after investigation of other sites, and in view of the generally inflated real estate values elsewhere in the neighborhood, this was chosen as a matter of convenience economy and speed of construction. In addition to the housing site, about 17 acres of land across Eighth Avenue was chosen as a park playground. Near Eighth Avenue there is a level area and then a wooded valley, the trees on the farther slope of which serve to screen the armor plate plant on the hill beyond from the park and

from the houses on the river bank. The housing site is open and fairly level, lying about 45 feet above the river at ordinary stages of the water. The river bank is steep and broken, with scattered trees. The soil is heavy red clay.

The common and semiskilled labor was obtainable locally, and for them the housing difficulty was not so acute. The skilled labor was to be imported from Philadelphia, Pittsburgh, and Cincinnati. As it was desired to employ men exempt from draft, the proportion of married men and older men would be high. Since it was impossible to offer higher wages to these men than were paid in other cities, better houses were an essential attraction, and dormitories would not meet the situation.

Considerable congestion and delay being found in the trolley transportation from the site to Charleston along Eighth Avenue, the corporation aided the trolley company in procuring cars and material for double tracking the road. Although this work was held up by a question of franchise it will ultimately result in cutting the running time to Charleston from about 40 minutes to perhaps 20 minutes.

The street and block system of the development was arranged with the fact in mind that no through traffic need be provided for within the development, that the streets should lead easily to a stop on the car line in Eighth Avenue, and that the view over the Kanawha River was worth preserving and enhancing. Toward the plant on the east the backs of the lots form the boundary, keeping the houses as much away from the plant as possible. On the west, however, there was built on account of previous arrangements a road common to our development and to the proposed private development adjacent.

The Navy Department has agreed to carry a main water supply line up to the eastern boundary of the project. The storm and sanitary sewerage is provided for in a combined system, discharging direct into the river. Electricity for houses and streets comes from the lines now supplying the ordnance plant. Since it has been the custom in Charleston to use natural gas, and the

supply is still available and cheap, it will be used in this development for both cooking and heating purposes.

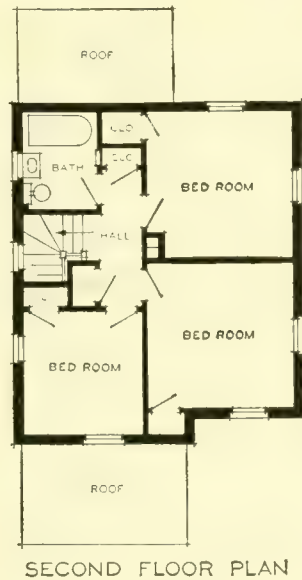
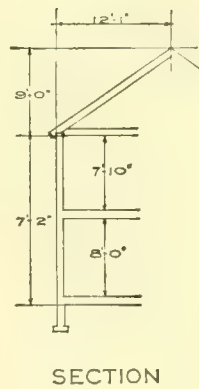
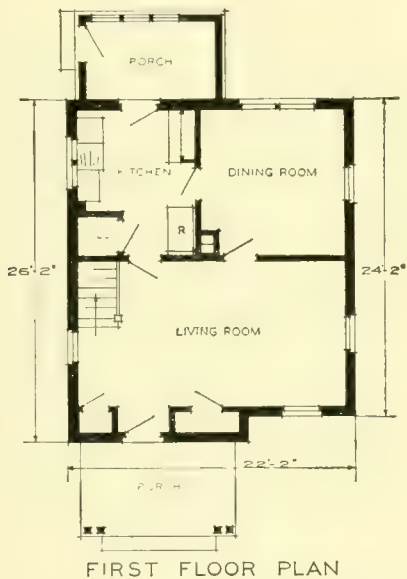
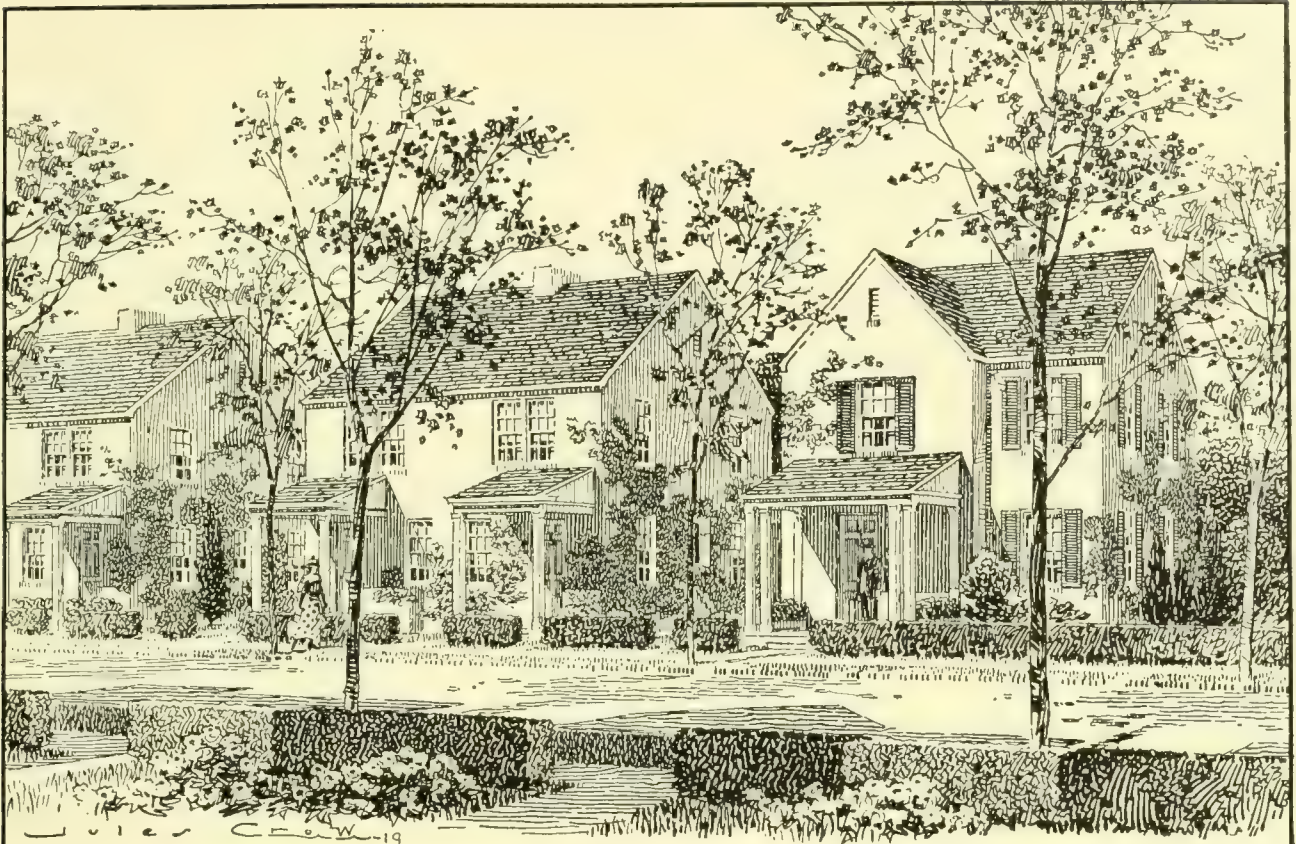
Since the land was free the lots were made a little larger than common. The houses were carefully arranged so that as far as possible the service sides of two adjacent houses should face each other, and, therefore, the living sides should enjoy the best available outlook. The use of certain house plans "reversed" facilitates this as well as giving general variety.

On account of the size of the lots a sufficiently good fence around each lot would be more than ordinarily expensive. We therefore substituted hedges, but along the fronts we placed hedges on certain lots only where they were most needed to stop short cutting and to give variety of appearance. We felt that using hedges consistently along every lot front would tend to give the development in

the eyes of the prospective householders a cut and dried and paternalistic appearance, especially to be avoided in this case where at best some dissatisfaction might arise from the necessarily permanent governmental land ownership.

The houses are of terra cotta, stuccoed. The first impression which the houses give is that of too great similarity and a certain barrenness. Had there been a greater variety of types and color the appearance would have been improved. Much of the difficulty arises, however, from the fact that the house designs were among the first that were submitted to the corporation, and that before being constructed several minor details, such as blinds, very important in the appearance of the houses, were omitted for economy. Some of these may later be replaced. The houses are, however, very well designed and the plans carefully worked out.



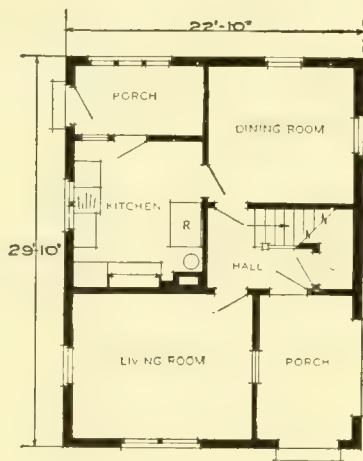
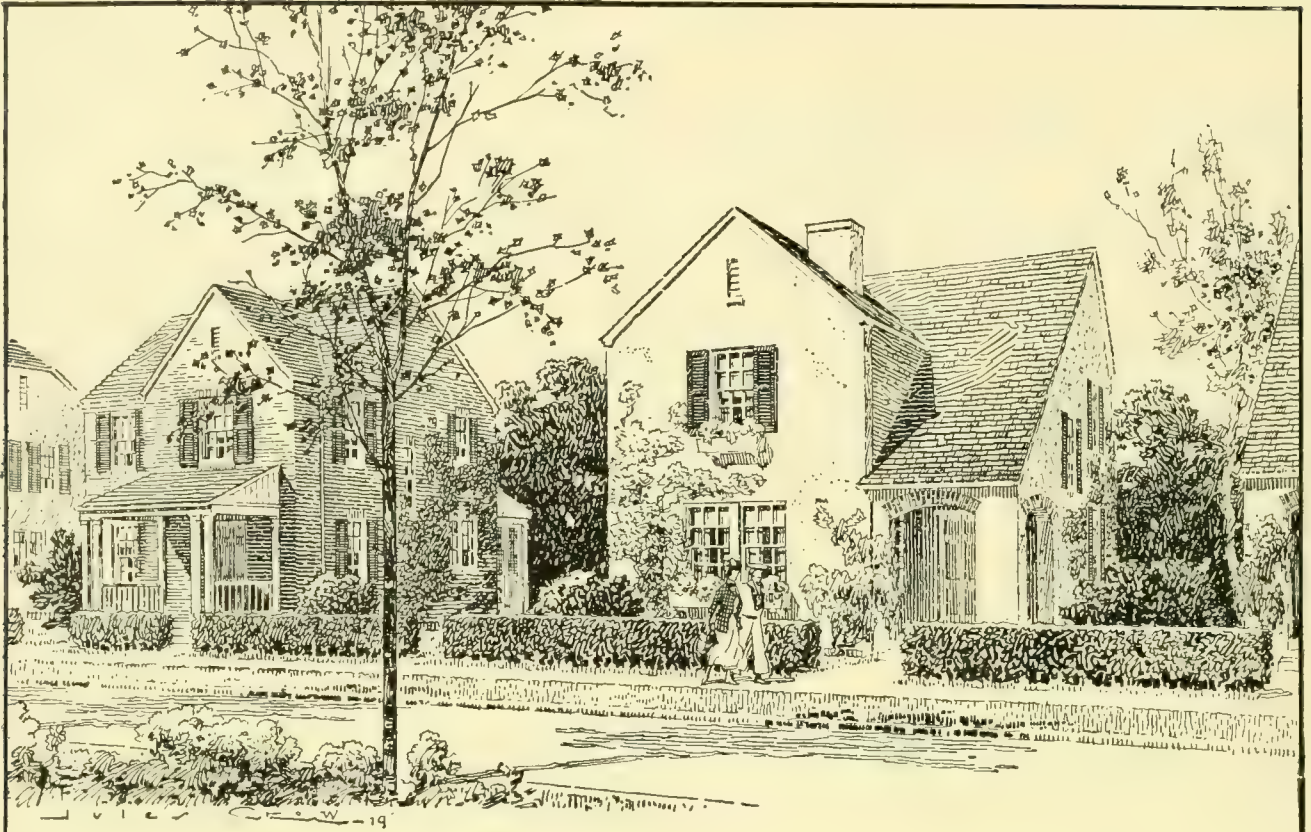


SIX ROOM HOUSE TYPE D

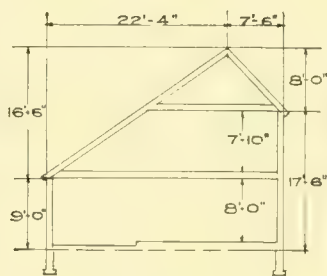
SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT CHARLESTON W VA

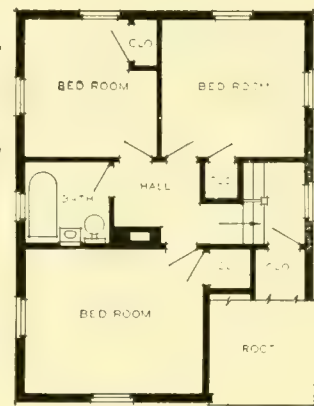
ARCHITECTS GODLEY HASKELL AND SEDGWICK



FIRST FLOOR PLAN



SECTION



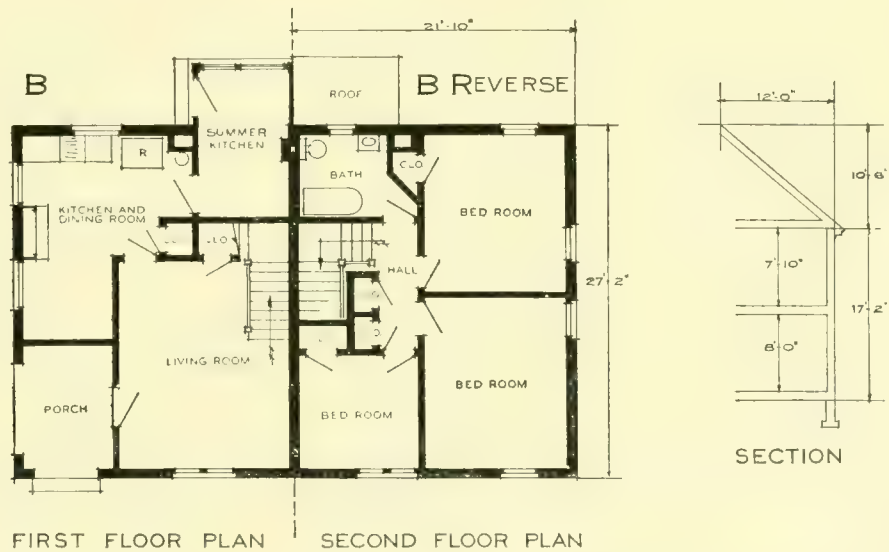
SECOND FLOOR PLAN

SIX ROOM HOUSE TYPE E

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT CHARLESTON W VA

ARCHITECTS GODLEY HASKELL AND SEDGWICK

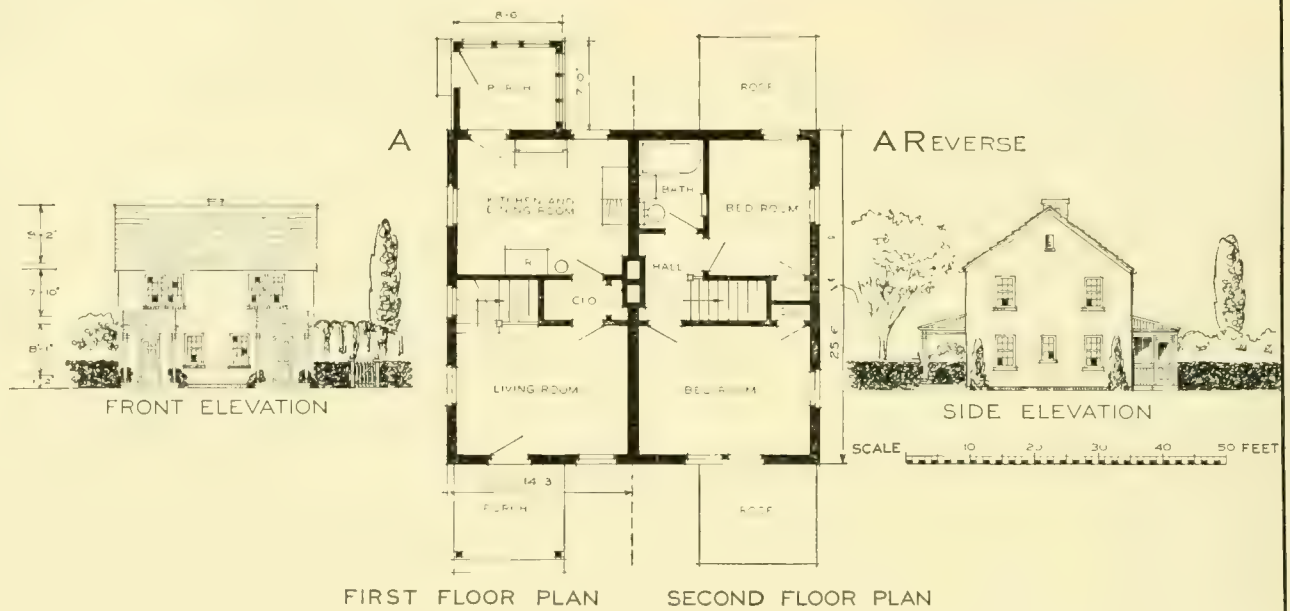


FIVE ROOM SEMI-DETACHED HOUSES TYPES B AND BR

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT CHARLESTON W VA

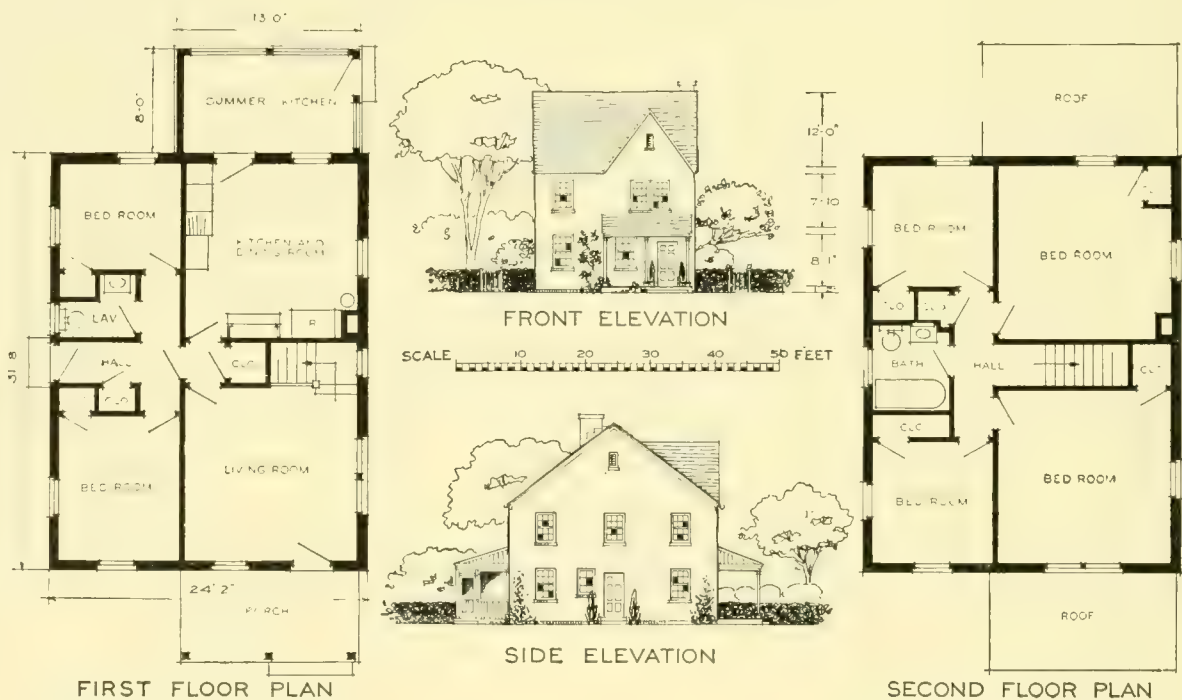
ARCHITECTS GODLEY HASKELL AND SEDGWICK



FOUR ROOM SEMI-DETACHED HOUSES

TYPES A AND AR

SCALE 5 10 15 20 25 FEET



EIGHT ROOM HOUSE

TYPE G

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT CHARLESTON W VA

ARCHITECTS

GODLEY HASKELL AND SEDGWICK

CHESTER, PA.

Eddystone Site (Project No. 1635); Ridley Park Site (Project No. 2947).

Chester is now practically a suburb of Philadelphia constituting a part of its southwestern industrial district and lying along the Delaware River. Greater Philadelphia is the largest ship building center in the world and Chester includes some of the large plants of the Emergency Fleet Corporation and that of the Sun Ship Building Corporation. There also are the great works of the Eddystone Rifle Plant of the Midvale Steel & Ordnance Co., the Eddystone plant of the Baldwin Locomotive Works, manufacturing locomotives, and the Eddystone Munitions Co., manufacturing shells. All the latter are at Eddystone, a borough in the east environs of Chester. In 1910, Chester had a population of 38,537. By September, 1918, it had 80,000 to 100,000 with 2,000 to 3,000 in the environs

It was, however, still to all intents and purposes an overgrown country town, and reckoning five people to a house, it had housing for only about 53,000 people. Of course the congestion was extreme. One house with six bedrooms registered 54 men in the last draft. A former movie house remodeled as a lodging house had 87 rooms with 100 beds, 43 of these rooms dark interior cubicles impossible of ventilation. There were buildings where lodgers occupied beds throughout the day in three eight-hour shifts. Conditions surrounding many houses were grossly insanitary. Some streets were without sewers and the conditions about many of the houses facing them were indescribably foul. Drinking water was furnished by a private company by meter and in many houses the supply was cut off. When houses were without water, it was sometimes purchased from neighbors at 5 cents to 25 cents per bucket. Because of Chester's total inability to meet the situation it was evident that the Government should come to the rescue.

The Emergency Fleet Corporation aided 3,736 shipyard workers by building houses, apartments, boarding houses, and other housing. It double tracked one of the street railroads from Philadelphia so that 18,000 instead of 600 people could be handled per hour in one direction and thus enabled that increased number of men to live in Philadelphia. It financed the purchase of 22 more cars so that

2,200 more men could live where congestion was less acute.

The Housing Corporation came on the ground much later, and in the time which we had before the signing of the armistice all we were able to accomplish was to prepare, ready or practically ready for contract, plans providing about 1,600 houses on the two sites here illustrated, for the particular benefit of the workers in the Eddystone plants. The Eddystone site was in part for common labor and in part for better paid workers, the Ridley Park site for high-class mechanics.

On September 26 in accordance with the decisions based on the preliminary investigations, the committee of designers brought in their preliminary sketches for Eddystone and Ridley Park. Meantime, the housing situation had become still more pressing, and as it was generally believed that this country must and would put forth its greatest effort early in the year 1919, the Housing Corporation felt, more than had been the case before, that sacrifice of housing permanence and attractiveness to speed was in this emergency justified. The committee of designers were therefore directed to proceed at once to Chester, to find sites for such temporary development as was possible of quickest execution, and to report on this with a scheme of procedure. They reported on September 30 as follows: First, that temporary dormitories, which had been before discussed but not on the whole considered an effective use of funds, be started at once for 500 people, on Eddystone Avenue and that the portion of the Eddystone site between Chester Turnpike and the Baltimore & Ohio Railroad be developed at once with about 221 permanent houses; this all for unskilled workers. Second, that the portion of the Eddystone site immediately north of the Baltimore & Ohio Railroad be developed for 261 houses for higher paid workers. Third, that the Fairview Avenue part of the Eddystone site be next developed, the remainder of the Eddystone site next, and the Ridley Park site last.

By November 11 the plans for the dormitories handled by the Housing Corporation had been completed and contracts let, and plans for the first section of the Eddystone site were complete

and in the hands of the bidders. On this date, the need for maximum industrial effort being suddenly at an end, all the Chester projects were abandoned.

Eddystone (Project No. 1635).

Area planned: 167.43 acres. Housing planned: Detached houses, 2 families; semidetached houses, 134 families; row houses, 922 families; apartments, 70 families; total, 1,128 families. Single workers in dormitories, 608. Project discontinued.

For further information see tables, Chap. IX. (Except in Table 2, tabular data covers 580 families only.)

The series of sites which for convenience we called the Eddystone project lay as close to the industries to be served as under the circumstances it was practicable to put them. On account of the differences of topography, location, and land value on the one hand, and difference in the kind of people to be housed on the other, the whole plan divided itself into several different units.

First, the area west of Bullen's Lane and south of the Baltimore & Ohio Railroad and adjacent to the Eddystone Rifle Co. plant, an intensive development of row houses for lower-paid workmen.

Second, north of the Baltimore & Ohio Railroad, west of the park, and south of Parker Avenue, an area of larger lots and row houses spaced more openly and interspersed with some semidetached houses, for workmen who are higher paid.

Third, east of the park, on both sides of Parker Avenue a development similar to the second, somewhat simpler, cheaper and less ample.

Fourth, west of the park, north of Parker Avenue, an area on cheaper land, offering the largest lots, and semidetached houses, to those who would purchase room and greater privacy by a somewhat higher payment and a longer walk or ride to their work.

Fifth, temporary dormitories on Eddystone Avenue (not shown on the accompanying plan).

The valley of Crum Creek, too steep and too low to be developed for housing, was planned as a park, an improvement very desirable immediately for our development, and in the future for the whole surrounding neighborhood.

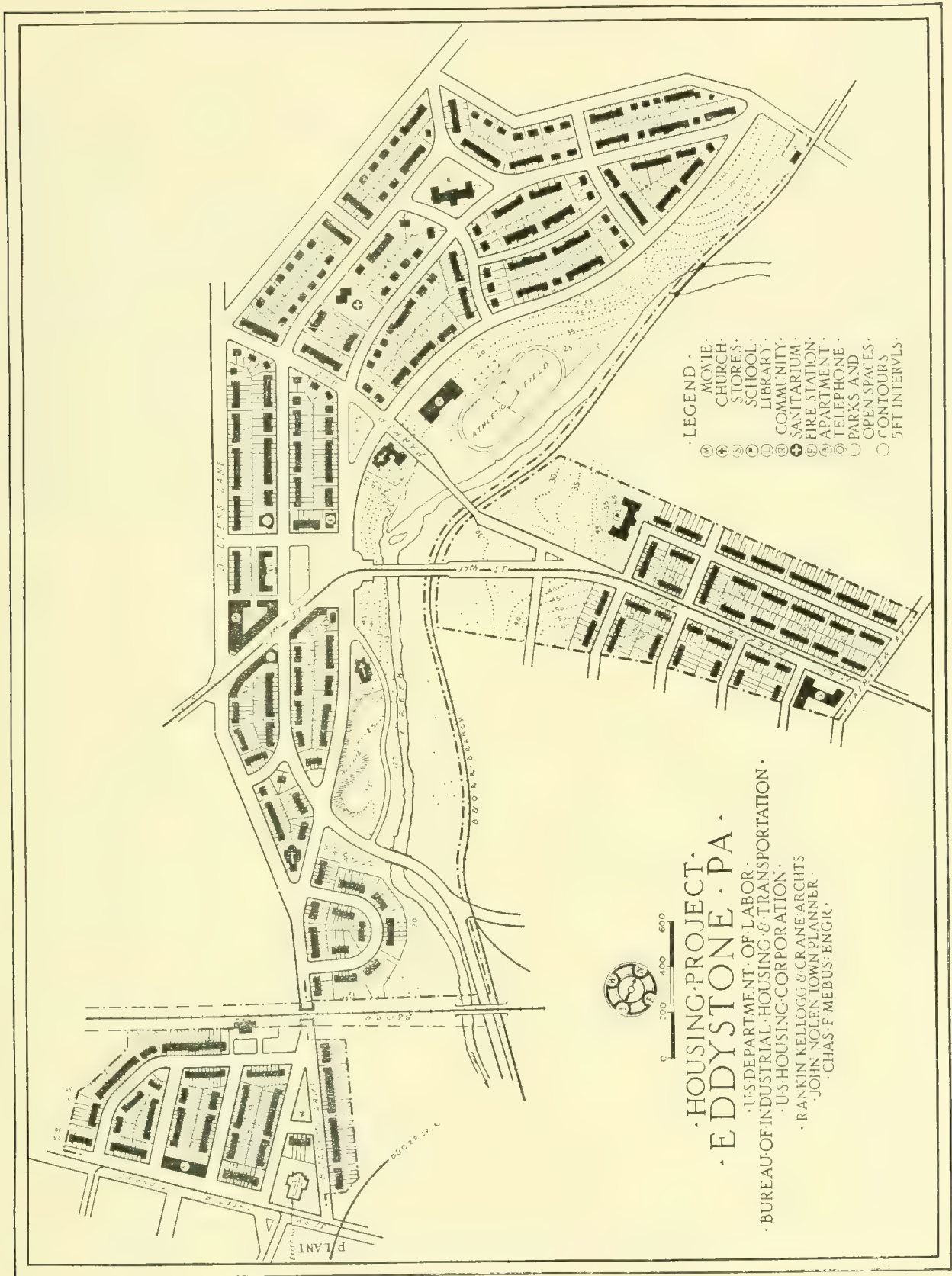
On the site, as we found it, the street car line crossed Crum Creek by the cheap and narrow Parker Avenue bridge, making an unfortunate detour from Seventeenth Street, northwest, along Bullen's Lane, and thence to Parker Avenue. Our plan called for a new bridge across Crum Creek, cutting out this detour, and giving an opportunity to develop a center at the bridgehead, with stores, theater, and

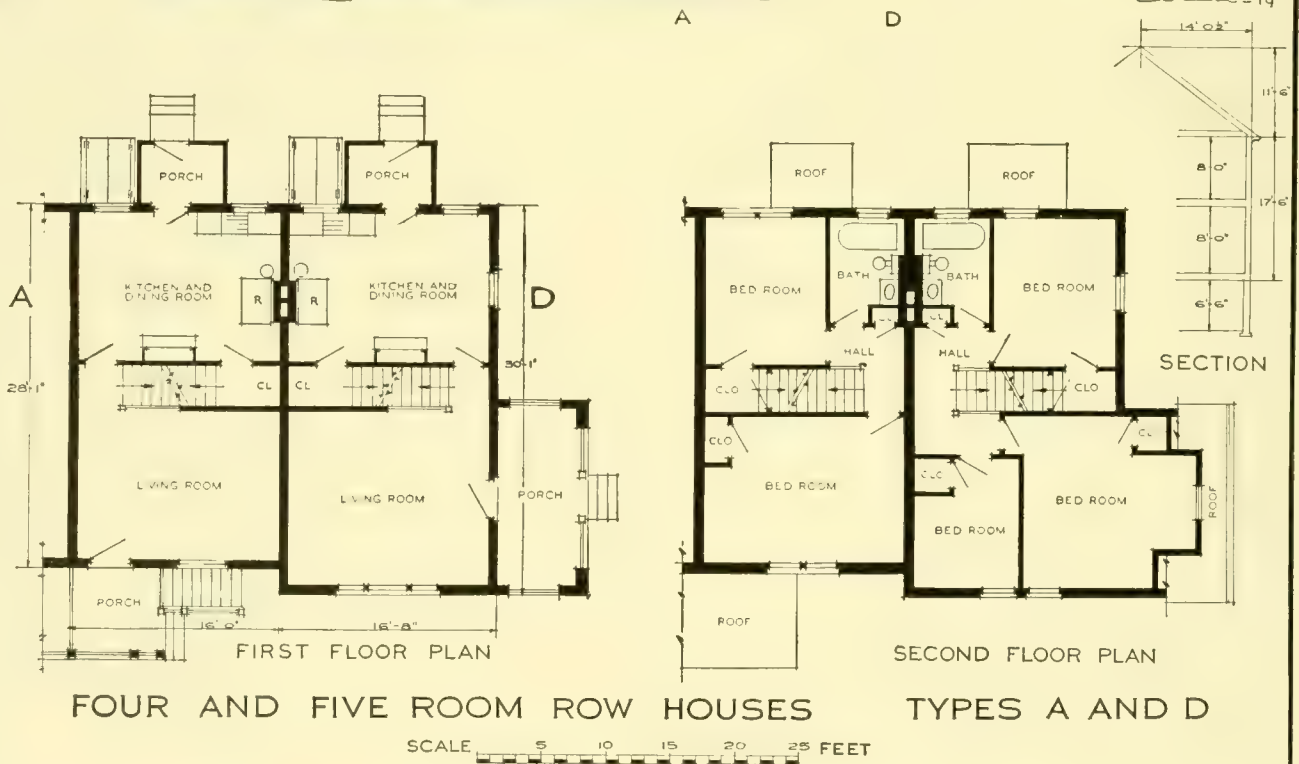
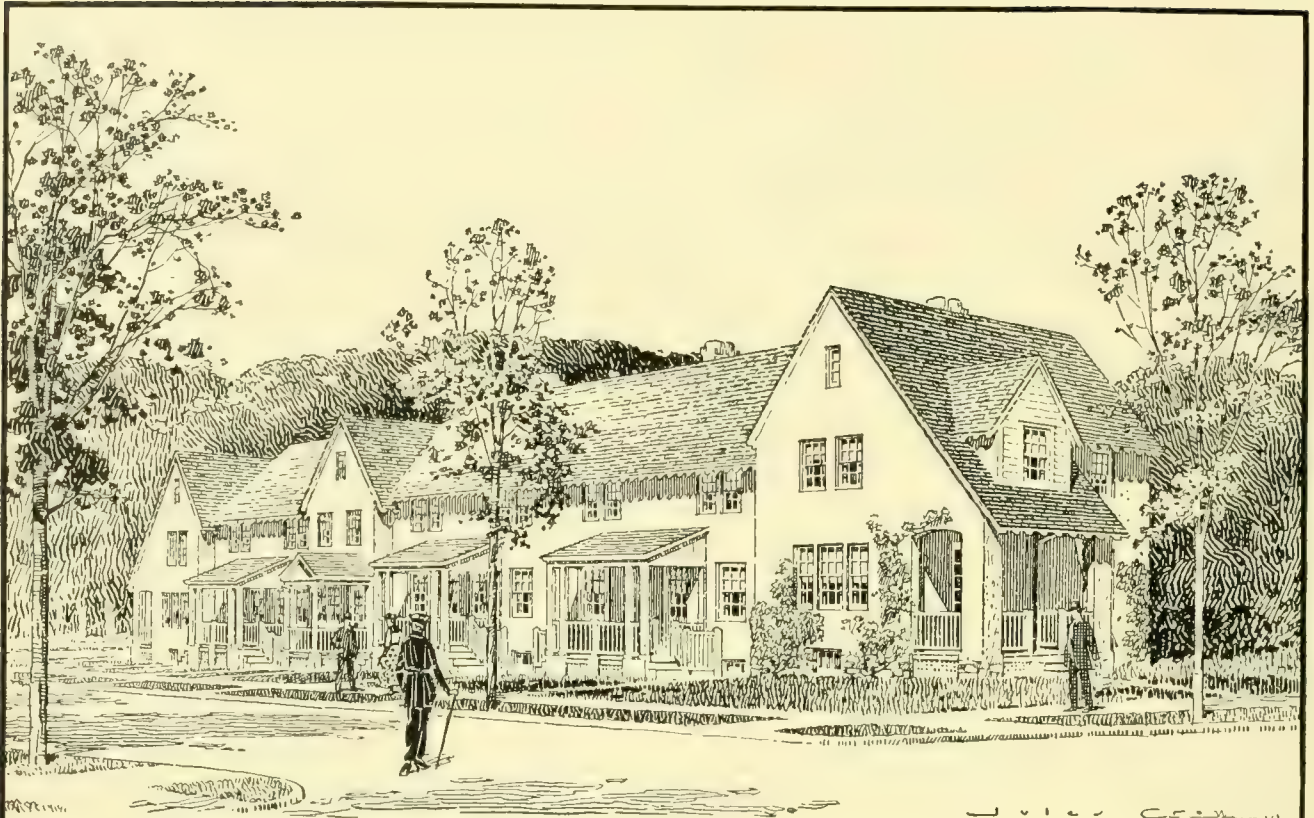
other community facilities. The old bridge was to become of minor importance, carrying no car line.

Most of the streets of this district are paved with a bituminous macadam, and it was proposed to use this type of paving in the principal streets of the two developments. The secondary streets would have been paved with water-bound macadam. All the sidewalks would have been of concrete construction.

The water and gas supply offered no unusual difficulties, although in both cases the existing facilities and resources of the supplying companies had been outrun by the growth of the population, and the Housing Corporation arranged to advance money to start work at once, to be repaid from future earnings. The natural drainage for the Eddystone site would have been into Crum Creek, but as the Springfield Water Co. takes its supply from a point farther up, the flow has been greatly reduced, and also, as there is a dam below Chester Pike within the plant of the Baldwin Locomotive Works, it was found that if the sewage was emptied into Crum Creek, it would have to be treated. A short distance west of this site is Ridley Creek, a stream of much greater flow and sufficient to dilute the sewage which would come from the Eddystone site. It was found that, by careful layout of the streets north of the Baltimore & Ohio Railroad, the sewage from this entire site could be drained into Ridley Creek with small additional cost for sewer mains and without any cost for sewage purification works.

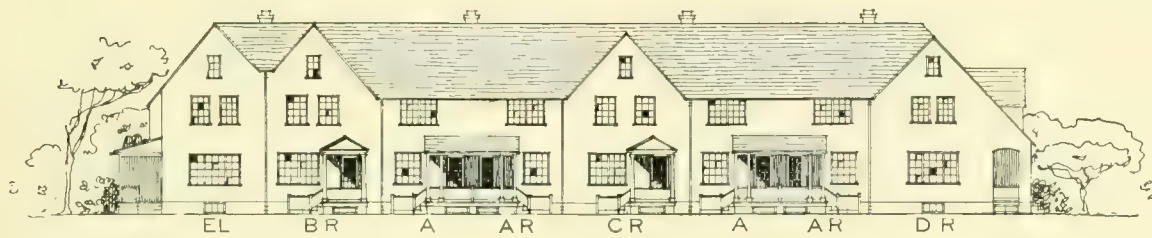
The dormitories and cafeterias of temporary construction are of the types shown in standard drawings. The permanent row houses in the Bullen's Lane site are designed in groups of from four to seventeen, with stucco and terra-cotta block walls and slate roofs. All the houses are 16 feet wide, and have the same basic four-room plan, but the end houses and the gabled houses which are placed at intervals in the long rows have five rooms. This additional room is gained by increasing the depth of the house 2 feet and dividing the front bedroom. In the interior houses, type A, these bedrooms are so small that the plan should have been used only for a house 18 feet wide. There are no alleys and the width of lot does not warrant the use of a service passage as at Ridley Park, so the inside houses are provided with area stairs in front and rear as well as an inside basement stairway. The exteriors are very simple, but have variety enough in the composition of groups.





UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT EDDYSTONE PA

ARCHITECTS RANKIN KELLOGG AND CRANE



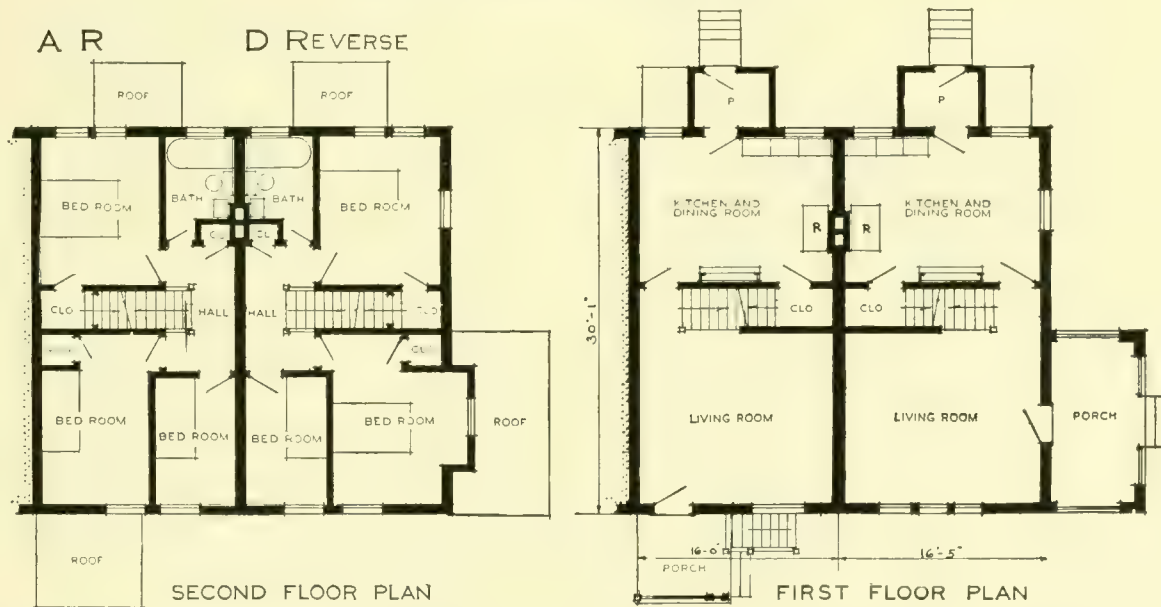
FRONT ELEVATION



END ELEVATION

END ELEVATION

SCALE 10 20 30 40 50 FEET



SECOND FLOOR PLAN

FIRST FLOOR PLAN

FIVE ROOM ROW END AND ROW HOUSES TYPES A R AND D R

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT EDDYSTONE PA

ARCHITECTS RANKIN KELLOGG AND CRANE

Ridley Park (Project No. 2947).

Area planned: 54.19 acres. Housing planned: Semidetached houses, 60 families; row houses, 483 families; apartments, 22 families; total, 565 families.

(Project discontinued. For further information see tables, Chap. IX.)

The Ridley Park site was about 2 miles from the benefited industries, but connected with them by the Philadelphia and Chester turnpike, a paved main street with water, gas, and electricity and with a trolley line, which passed along the south border of the site. The property to the north is a well-developed suburb of Philadelphia; the property to the east, south, and west is sparsely settled or vacant. The value of the land was high, and the development therefore had to be intensive to be at all economical. There were not in the neighborhood any local stores, schools, or churches at all sufficient to serve the proposed additional population. The main line of the Pennsylvania Railroad, to Washington, has a station near the north side of the site, and runs through the Baldwin locomotive plant with a station within its bounds, thus giving good transportation to the industries and to Philadelphia. Most of the housing site slopes gently down to the Chester turnpike. The northwesterly portion, however, falls quickly in the opposite direction to Stony Creek. The soil is a sandy clay, but is fairly well drained. Below is a gneiss, which in places would have to be excavated in the sewer trenches.

There is at the present time a 15-inch outfall sewer running from a point on Stony Creek and almost adjacent to the development down to tide-water at Darby Creek. This outfall had been constructed by Ridley Park Borough, and was of sufficient size to include the Ridley Park development. It was found that all that would be necessary was to construct the sewer mains and laterals within the development.

The street plan is for the most part a modified gridiron, with the longer streets running north and south, both to afford an east and west aspect for the row houses and to provide direct access to the

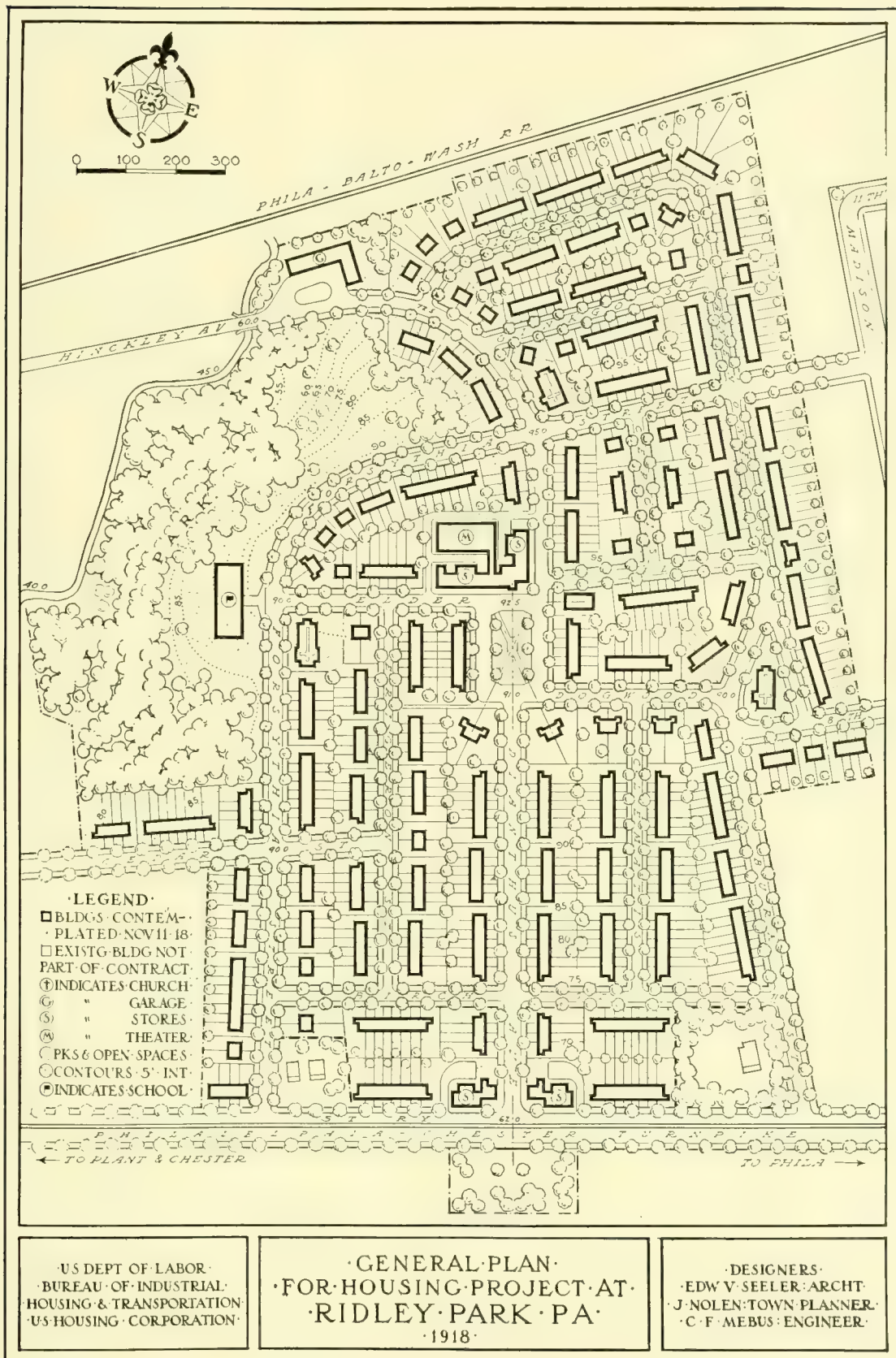
Chester turnpike. Dianthus Avenue, from the store group on the turnpike to the green with its surrounding public buildings in the heart of the development, is the main approach. It was unfortunate that the profile of this street was so rounded that looking from the turnpike the lower portion of the stores north of the green would have been invisible behind the hill. We considered whether we should not shift the whole town center forward to remedy this defect, but decided that on the whole the gains did not outweigh the losses.

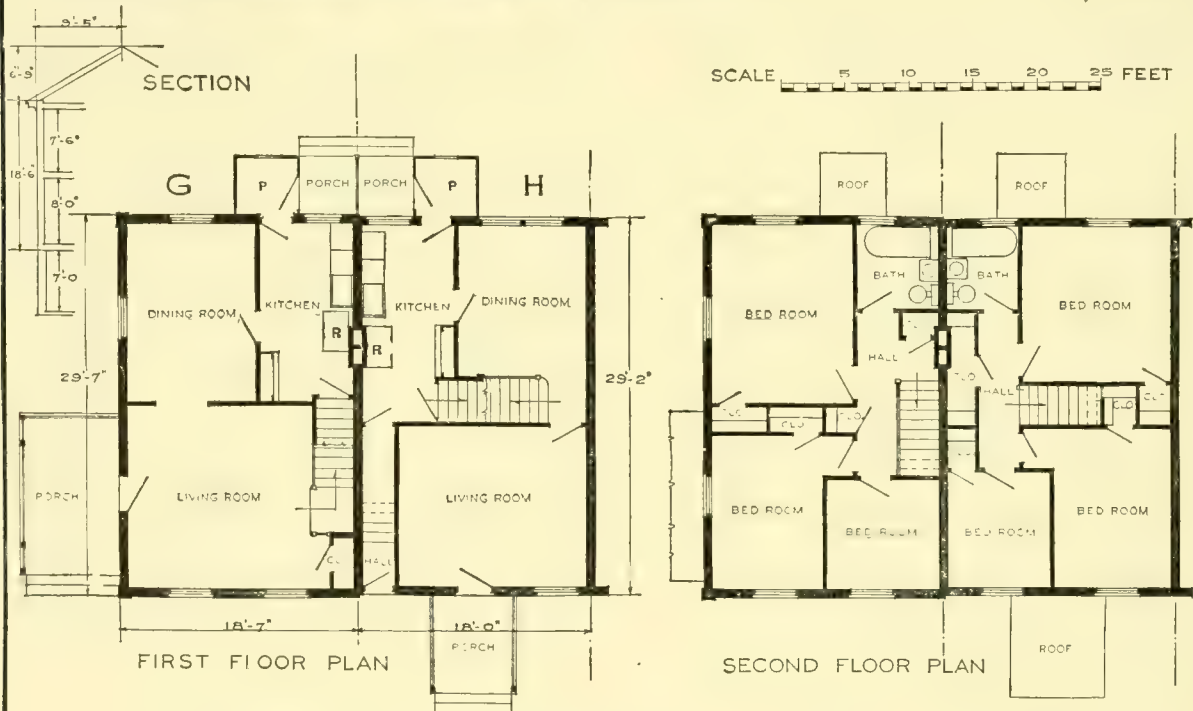
Opposite the main entrance to the property we planned to acquire and reserve a small area to prevent the loss of value in our development which would come if cheap stores or undesirable houses were built in this location. A similar precaution would have been desirable in this regard in other comparable cases, such as our Dayton development.

In almost every case the vistas down the streets were planned to be effectually closed by buildings of sufficient importance. The diagonal relation of the two pairs of semidetached houses to the central green is unusual, but we believe that it would be pleasant. The projection of these houses as shown beyond the line of frontage of the buildings on Dianthus Avenue is advisable. The space between each of them and the row house next to the south is, however, probably too great for the best appearance.

The economical location of the moving-picture theater is worth noting. The auditorium occupies the cheaper land within the block, only the entrance taking up valuable street frontage.

The houses, principally of brick, were planned in groups. The laying out of the site without alleys required a service entrance for kitchen and basement for all the interior houses, a problem which has been very satisfactorily solved. The houses are practically uniform in plan, but a sufficient and very pleasing variation in elevation has been accomplished by skillful grouping and taking advantage of change in grade. Semidetached houses of wood are introduced for variety and for placing at street terminations.





SIX ROOM ROW HOUSES

TYPES G AND H

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT RIDLEY PARK PA

ARCHITECT

EDGAR V SEELER

DAYTON, OHIO (PROJECT NO. 243).

EDGEMONT TRACT.—Area planned: 107.95 acres. Housing planned: Detached houses, 175 families; semidetached houses, 236 families; row houses, 31 families detached two-flat houses, 122 families; row two-flat houses, 160 families. Total, 787 families.
LEO STREET TRACT.—Area planned: 3.34 acres. Housing planned: Semidetached two-flat houses, 40 families.

(Projects discontinued. For further information see tables, Chap. IX.)

Dayton, Ohio, is located in the southwestern part of the State on moderately level land backed by broken hills, at the confluence of the Mad and Stillwater Rivers with the Miami. Its population in 1910 was 132,000 and in 1918 was estimated at 175,000. Of this number 160,000 was considered permanent.

There were over 200 industries in the city, 50 of which were on war work. The manufacturies were making tractors, small tanks, airplanes, gas shells and fuses for the Army, gun mounts and sights for the Navy, and engine parts for the Shipping Board. In 47 industries it was found that there were 38,000 employees, and the increase needed for these factories was over 7,000. One of the principal industries for which housing was required was the Dayton-Wright Airplane Co., where the number of employees was at that time 2,800 and it was proposed to increase that number to 4,000.

Two housing sites were selected, one known as the Edgemont tract, located in the southern part of the city, and the other, known as the Leo Street tract, in the northern part, near the Maxwell plant and McCook Aviation Field.

The Edgemont site was chosen as the most convenient and economical tract suitable to a consistent development of the required size. It is within walking distance of two of the Ohmer plants and that of the National Cash Register Co., while a car passing the Cash Register plant runs to the Wright Airplane factory. Another car goes to the plants in North Dayton in 35 minutes, while transfers will take one to the east and west in the same time. The site lies between Cincinnati Avenue, Stewart Street, and the new Miami levee, extending also for a block and a half north of Stewart Street. The land is mixed river deposit, generally sloping down toward the levee, but irregular as the water currents of former floods have left it. A considerable portion is high enough to offer no particular development difficulties. The part next to the levee, however, is low, and most of the site was inundated by the flood of 1913. It was expected, however, that if the housing were first built on the higher ground, by the time that the lowest land was developed the levee in Dayton and the

dams in the Miami River would have been far enough completed to protect the houses from damage by high water. Some of this low area was planned to be used, without much regrading, as a playground; the rest could be developed for housing at the cost of additional sewer construction. As the material for this fill could come most cheaply from the adjacent higher land, the street layout and profiles and the grading plan generally were adjusted to provide this material. Thus it was economical to develop the whole tract south of Stewart Street at once, but not any part of it separately.

Since there arose difficulty in obtaining all of this land which was necessary for economical development, it was decided to develop first the land on both sides of Stewart Street only, this being capable of being handled as a unit, and being nearest to the Cash Register plant by way of Stewart Street; nevertheless, the whole area which it was desired to obtain was planned as one development.

The general layout plan recognizes the triangular shape of the site. Curved roads parallel to the levee carry local traffic between Cincinnati Avenue and Stewart Street, leaving in an economical shape the low strip of park land next to the levee. The junction of Cincinnati Avenue and Stewart Street is the natural focus of the development, through which all traffic from the site to the center of Dayton naturally goes. Here were to be located the necessary stores and public buildings, and a main avenue was to run from here through the center of the development to the schoolhouse. It would have been desirable, from the point of view of appearance, and perhaps from the point of view of preservation of our created real estate values, to acquire and develop all the land around this main entrance to the project, but the extra immediate cost outweighed in this case the less concrete future benefits.

An unusual arrangement was planned in order to include a proportion of row houses without great change in the character of the whole development and without extra expense for access. In the middle of certain blocks there was to be a group of two rows of houses facing each other at right angles to the streets, on a little court of their own, served by

footpaths in front and alleys in the rear. The appearance of the street was not much affected by this arrangement, except as it made a pleasant point of interest when seen from opposite the court entrance. The row-house groups north of Stewart Street were reinforced by rows facing south into the courts across Smith Street. This made a more complete architectural composition, but necessitated an alley north of Smith Street, necessary only for the few interior row houses. Under the circumstances, however, this was excusable, as the adjoining property, not owned by the Housing Corporation, would probably require an alley in any case, in accordance with local custom.

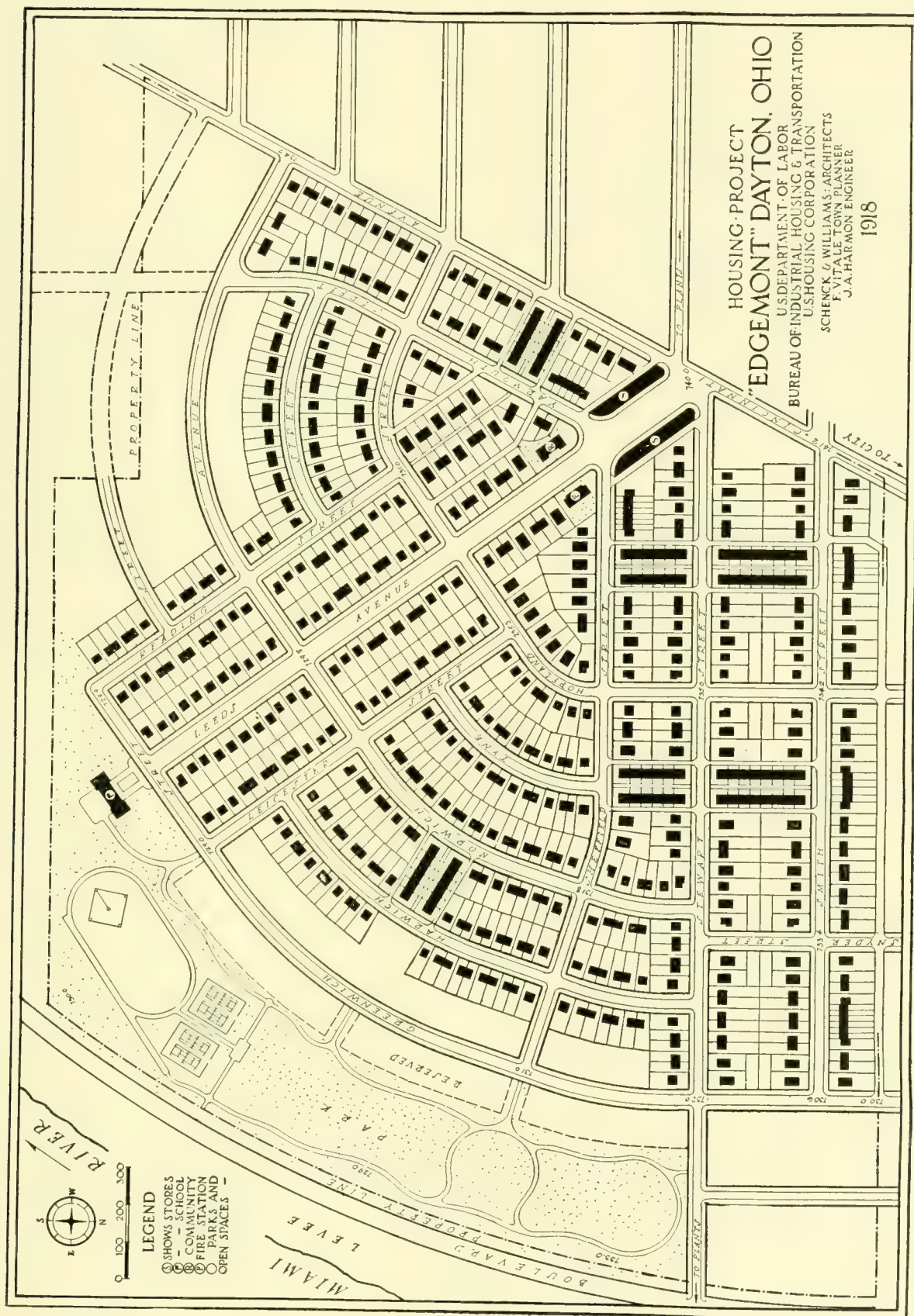
The path between the row houses north of Tyne Street continues the foot-traffic line of the street where a continuation of the street itself was unnecessary. Such an arrangement is economical in street construction and offers no real difficulties in use, but it is so different from local custom in most places that we introduced it only occasionally under specially favorable circumstances.

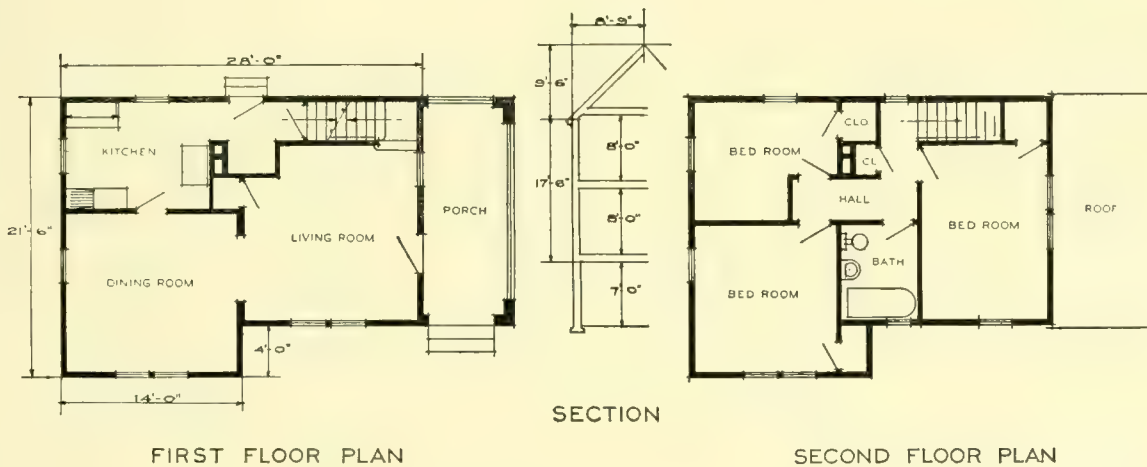
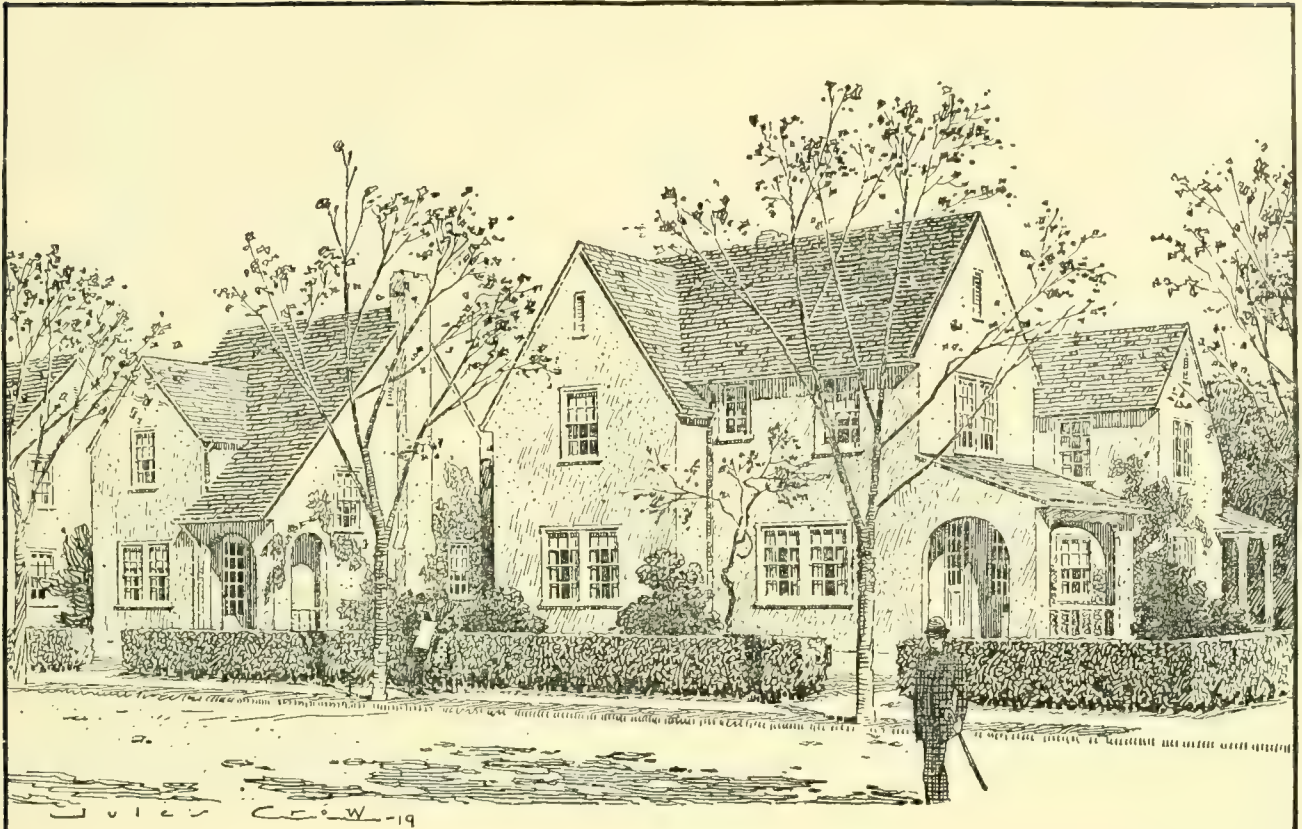
The smaller Leo Street site was on land already plotted and to some extent sold in private lots though not much built upon. A new lotting scheme was made for that part of the site which was to be immediately developed, and a simple layout scheme for a larger area was planned, but the armistice put an end to all activity on both sites.

The demand was for houses and apartments of a wide variety of sizes. Because of the large size of the project, 14 different types of houses were designed, 50 per cent of the five-room type, 25 per cent of the six-room type, and the rest of the three and four room types. On the Edgemont tract all 14 types of detached and semidetached houses and 12 units of row houses were proposed. The latter houses contain flats of three and four rooms about equally divided. An architectural arrangement of one entrance to serve four families helps to simplify the exterior mass of the buildings, though reducing the privacy of the individual dwellings.

Wood framing was proposed in all the houses, wood shingle and stucco exteriors being intermixed. Slate, which was easily procurable in the locality, and also demanded by the building laws, was used.

The variation of sizes of houses occurred generally throughout the project, detached and semidetached houses being in random rows. Not only do the houses vary in size and type, but there is a corresponding variety of design. This has perhaps been overdone, by planning some houses with little or no projection of cornices, alternating with some of wide projection; and a simple blocky mass of house immediately contrasting with a broken mass. The row houses as planned at Dayton also do not bear any studied resemblance to many of the smaller types.



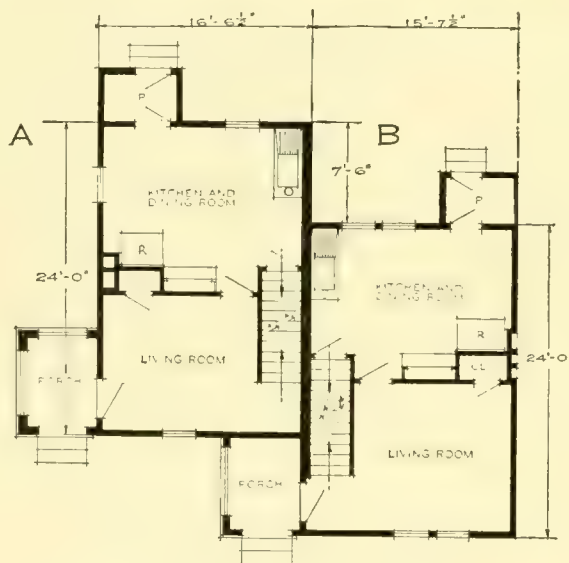
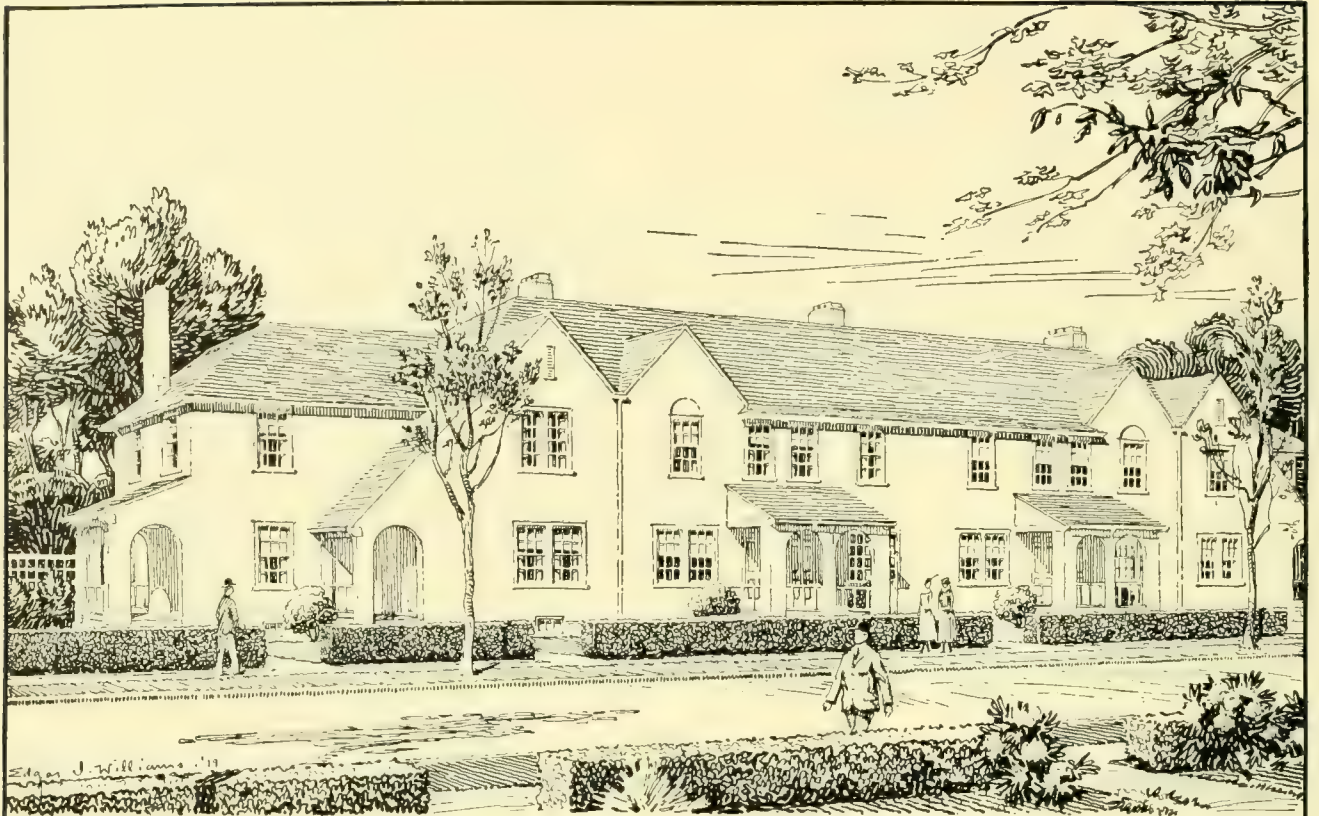


SIX ROOM HOUSE TYPE B

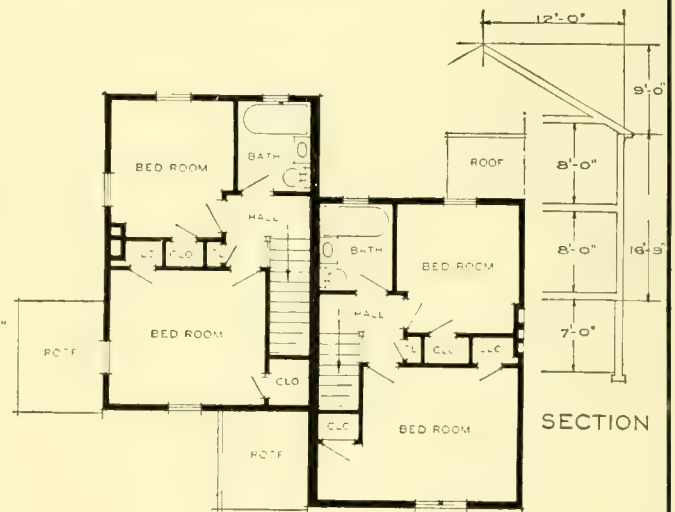
SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT DAYTON OHIO

ARCHITECTS SCHENCK AND WILLIAMS



FIRST FLOOR PLAN



SECOND FLOOR PLAN

FOUR ROOM ROW HOUSES GROUP H8 TYPES A AND B

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT DAYTON OHIO

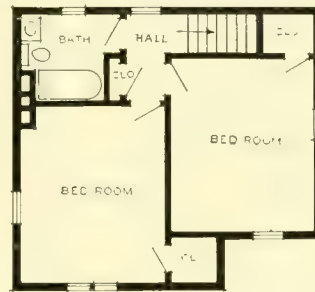
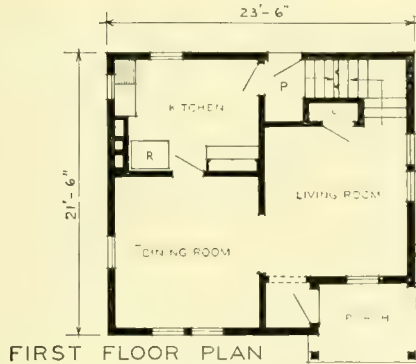
ARCHITECTS

SCHENCK AND MEAD



FRONT ELEVATIONS

SCALE 10 20 30 40 50 FEET



SECOND FLOOR PLAN

FIVE ROOM HOUSE TYPE D

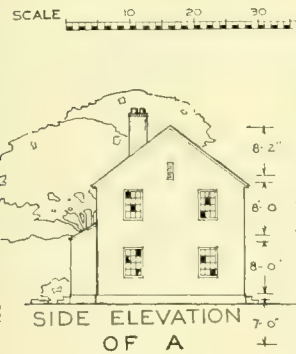
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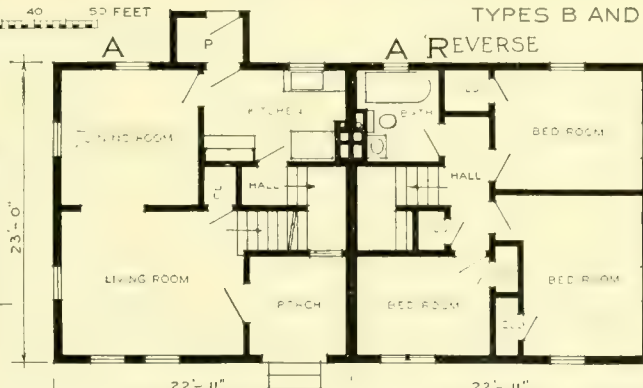
FRONT ELEVATIONS

TYPES B AND B R ARE DETACHED HOUSES

SCALE 10 20 30 40 50 FEET



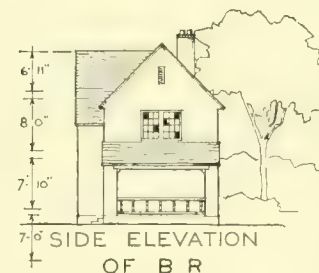
SIDE ELEVATION OF A



FIRST FLOOR PLAN

A REVERSE

SECOND FLOOR PLAN



SIDE ELEVATION OF B R

SIX ROOM SEMI-DETACHED HOUSES TYPES A AND A R

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT DAYTON OHIO

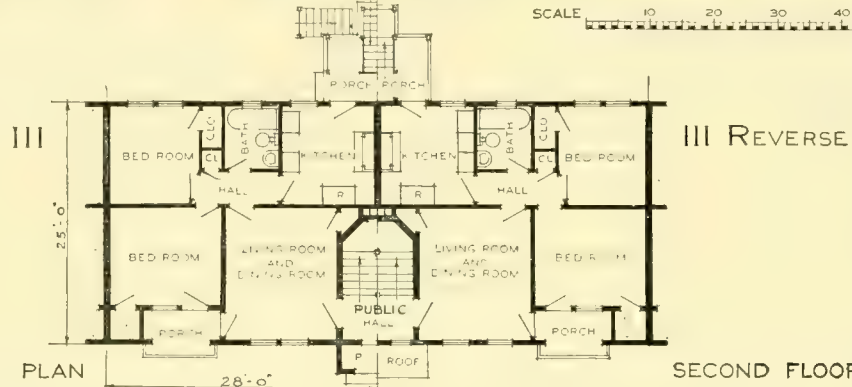
ARCHITECTS

SCHENCK AND WILLIAMS



FRONT ELEVATION

SCALE 10 20 30 40 50 FEET



FIRST FLOOR PLAN

SECOND FLOOR PLAN

ROW TWO FLAT HOUSES GROUP X 12

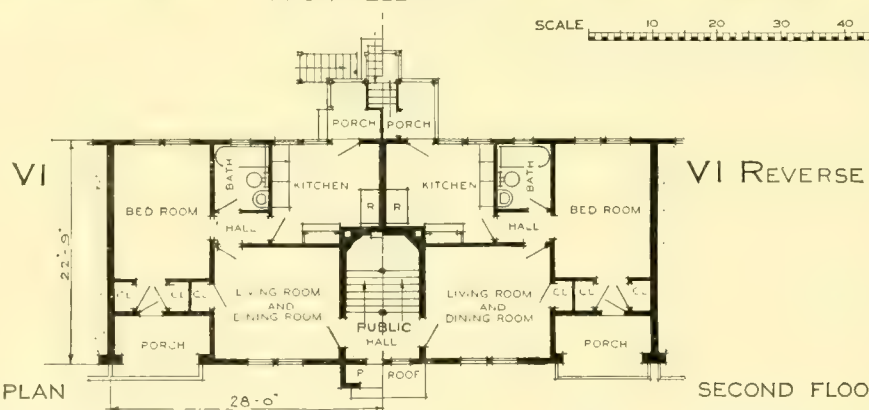
TYPES I-II-III

SCALE 5 10 15 20 25 30 FEET



FRONT ELEVATION

SCALE 10 20 30 40 50 FEET



FIRST FLOOR PLAN

SECOND FLOOR PLAN

ROW TWO FLAT HOUSES GROUP Y 12

TYPES IV-V-VI

SCALE 5 10 15 20 25 30 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT DAYTON OHIO

ARCHITECTS

SCHENCK AND WILLIAMS

ERIE, PA. (PROJECT NO. 10).

The population of Erie was 78,000 according to the census of 1910 and is now estimated at about 110,000. It is a city of numerous industries, practically all of which turned to munition manufacturing of one kind or another during the war. The largest war industries were the General Electric Co., the American Brake Shoe Co., and the Erie Forge Co. Among them they employed some 20,000 men, which was at least three times their normal force, and because of this large increase and of numerous other additions to the working forces of industries throughout the city, insufficiency of housing in Erie became very serious.

The United States Housing Corporation decided to relieve the situation by building houses, and for this purpose secured three sites, one on the east, one on the west, and one on the south. The total housing capacity of these three sites was 1,500 families, but at the time of the armistice construction work had been begun only on the east and west sites, which accommodated some 700 families. All three sites were outside of the corporate boundaries, but proceedings were under way to incorporate them into the city proper.

East Site.

Area planned: 27.26 acres. Housing planned: Detached houses, 37 families; semidetached houses, 60 families; row houses, 88 families; apartments, 38 families; total, 223 families.

Housing constructed: Detached houses, 26 families; semidetached houses, 26 families; row houses, 8 families; total, 60 families.
(For further information see tables, Chap. IX.)

The east site, several miles from the main built-up section of Erie, is in the vicinity of the plant of the General Electric Co., between the plant and the city. It is a rather level district easily drained and prepared for the construction of buildings, and is a portion of an area previously acquired by this company for housing purposes. The tract extends between two thoroughfares, East Lake Road on the north, now the principal thoroughfare running to the east, and Tenth Street on the south, as yet unopened, but destined to be an important

means of access to the General Electric plant a few blocks to the east. As this plant prevents the extension of any intermediate through streets they were diverted in the plan to accommodate the most advantageous arrangement of houses.

A low area with a small creek has been reserved as a park, and the frontage on East Lake Road set aside for a few stores and apartments. There are, however, no other community features, as the tract is too small to warrant including them. The school board contemplates acquiring a school site immediately adjacent on the west.

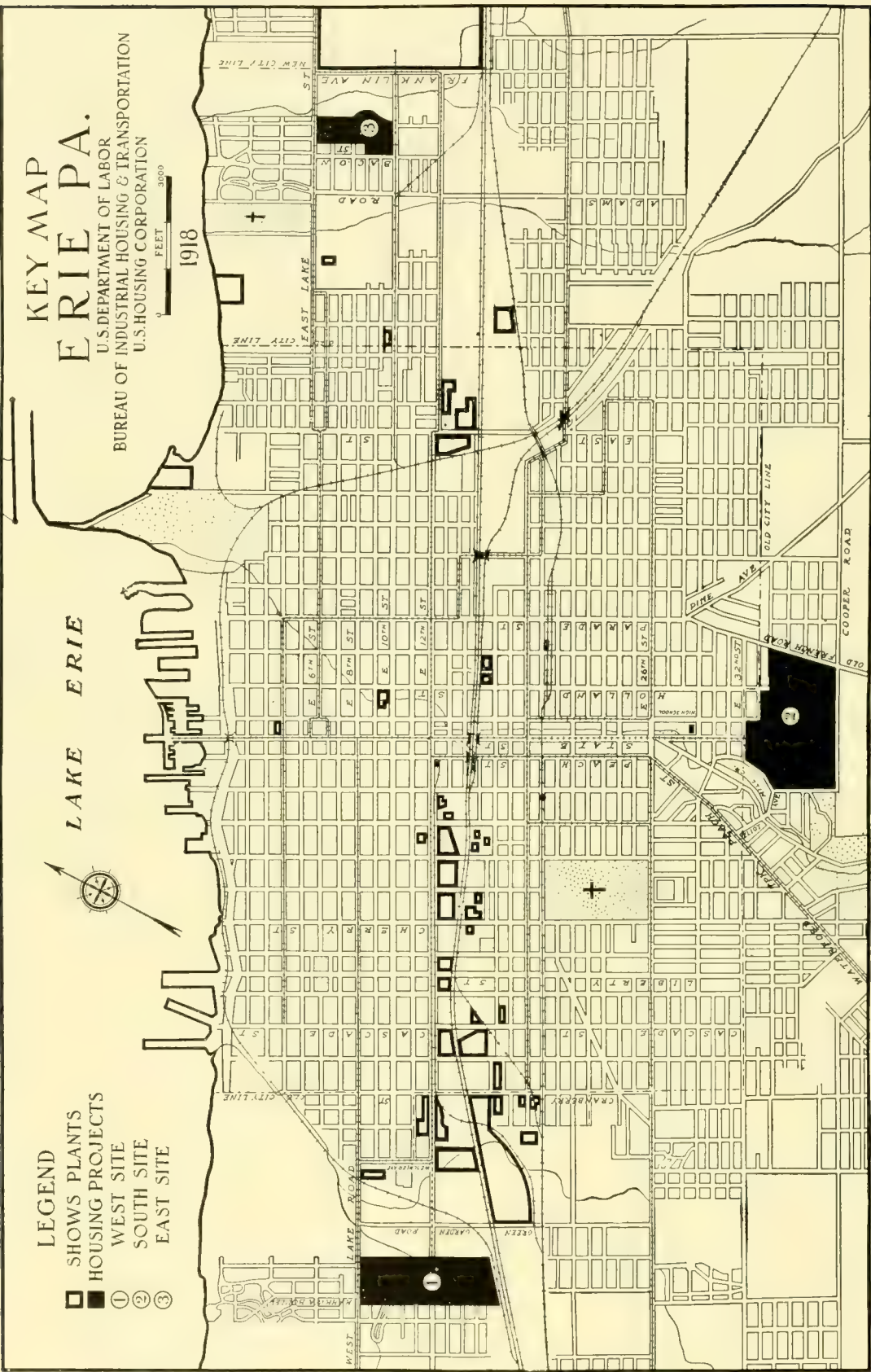
Comparatively few houses of the corporation's developments have brick exteriors; comparatively few have slate roof covering, and still fewer have both brick and slate. The Erie project is one of those in the latter category, the use of brick being determined upon because Erie is in the center of the brick industry of the section. To these materials one may attribute part of the good effect of this project—the color, the appearance of stability, and the lack of newness; but more important than any of these desirable qualities is the beauty of the design of each individual building. The houses have been excellently placed in relation to one another along the streets.

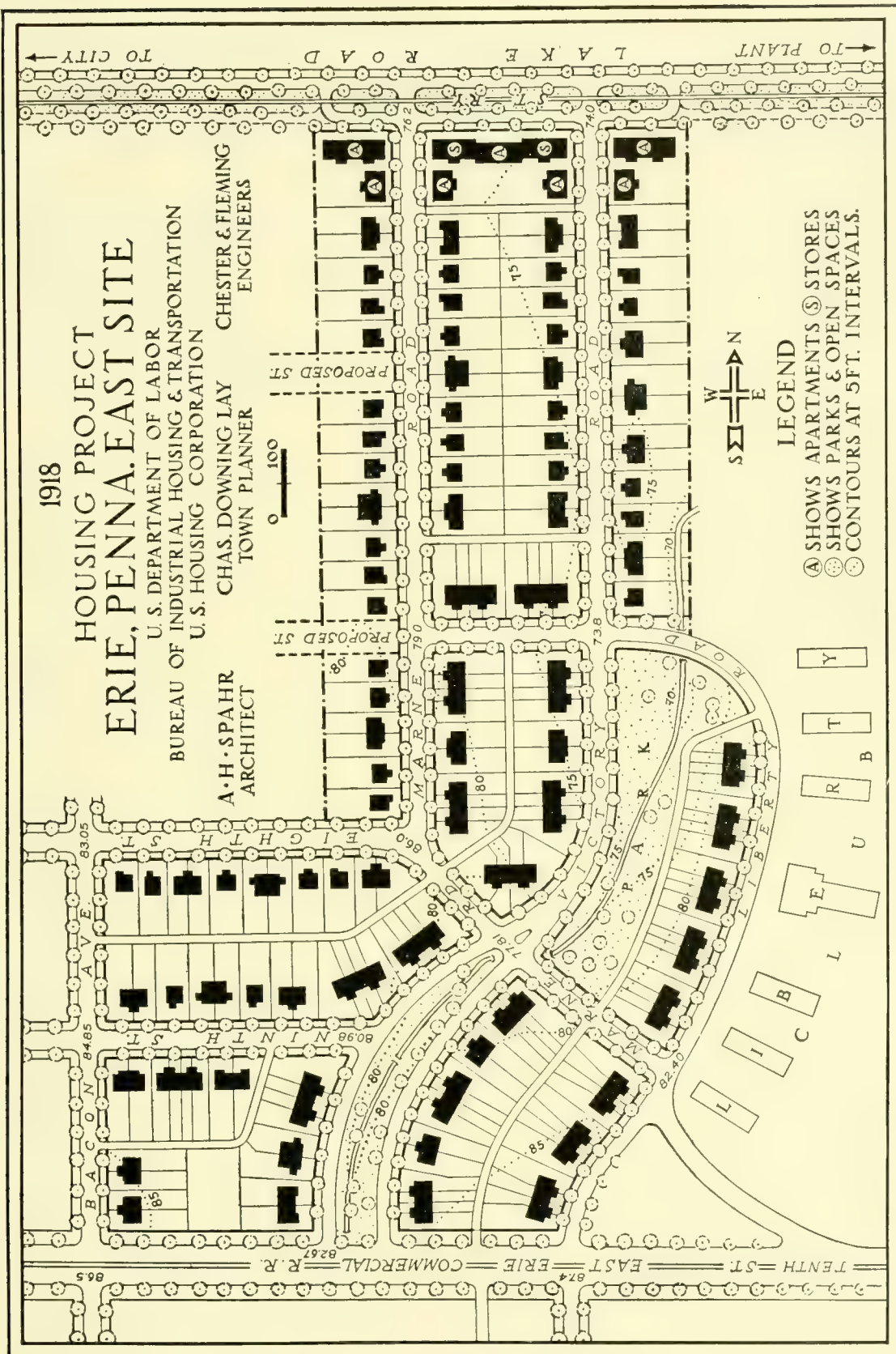
The plan types are the corporation's.

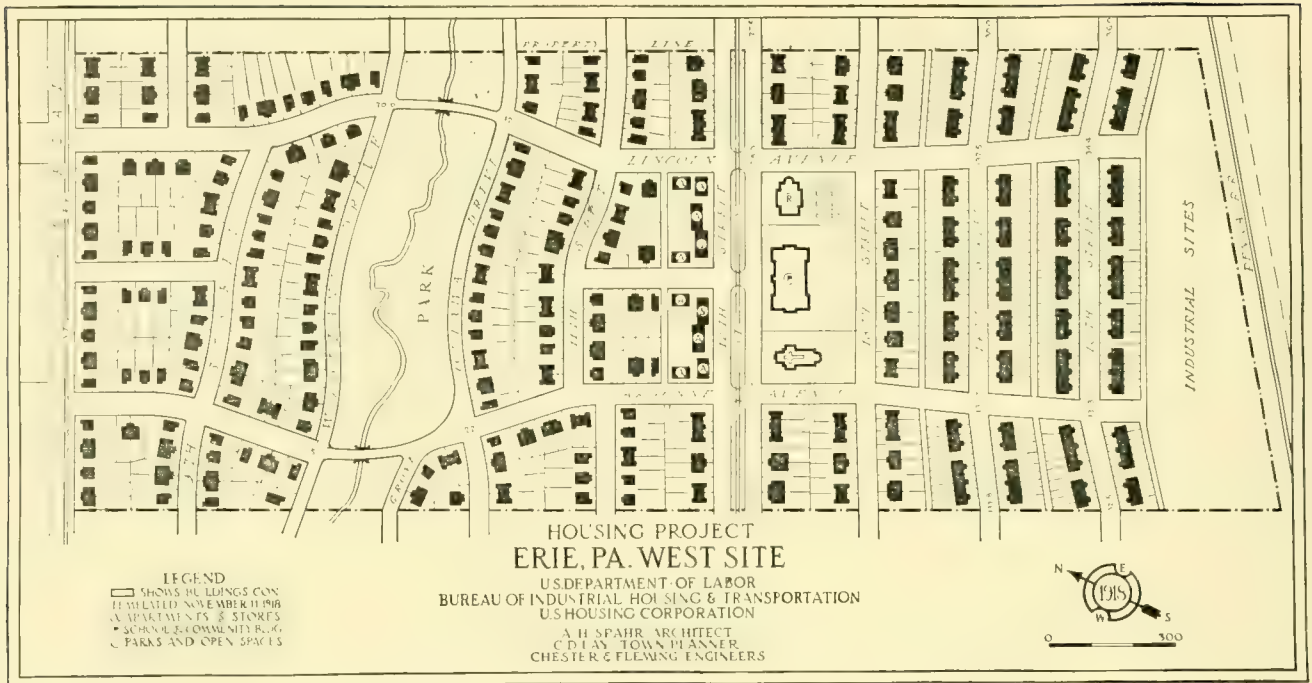
An analysis of the house designs might condemn the porches, which project too much. This criticism applies to most of the houses and is especially true of the gabled porches, which look entirely too large.

A great many houses are of veneered common brick, while others are constructed of a special hollow brick and furred inside. Other exteriors are of stucco over 8-inch tile, and these, too, have been furred inside. There are no houses of shingle or clapboard.

The interior finish is very good. Closets are fitted with hanging poles, and a notable feature is the proper and substantial construction of the wood lattices covering the cold-air returns to the furnace.







West Site.

Area planned: 71.99 acres. Housing planned: Detached houses, 95 families; semidetached houses, 172 families; row houses, 200 families; apartment houses, 32 families; total, 499 families. Housing constructed: Detached houses, 30 families; semidetached houses, 66 families; row houses, 161 families; total, 257 families.

(For further information see tables, Chap. IX.)

The west site is located west of the city limits directly opposite the east site and about 5 miles distant. It is situated in the vicinity of the American Brake Shoe Co., which manufactures shells and employs 7,500 men, and of the Erie Forge Co., which employs from 3,000 to 5,000 men. It is now reached by West Lake Road, along its north boundary, but the future highway of greater importance is Twelfth Street, which will extend the main backbone of the Erie street system directly through the middle of the tract. It will at once become the means of principal access to the factories served by the project even before it is opened as a highway. A grade crossing elimination is, however, involved before the opening can be completed. This has been contemplated for some time, plans have been drawn, and it is in the class of public works which can be properly carried out as part of the campaign to relieve unemployment. Access across the tract was planned by Argonne and Lincoln Avenues and the other streets were placed where they would give the maximum number of usable lots of the desired size. The ravine

makes a very attractive informal park between the two transverse streets. Roadways are designed to go along the crest on either side. It is hoped these will eventually connect with an extension of this parkway the length of the creek.

The store center occupies two blocks in the center of the tract on the north side of Twelfth Street. Opposite it sites for a church and one originally intended for a school were reserved. However, it was found that the school district commissioners took a very progressive viewpoint and desired a larger area for a new west side high school to serve both sides of West Lake Road; therefore the area previously laid out as three residential blocks in the north part of the tract was finally used for school purposes.

Alleys are used only where there are group houses. For economy these were concentrated on two streets in the less valuable section of the tract, Fourteenth and Fifteenth Streets, except that groups of three houses were used at several street corners with access from the middle rear yard to the side street in each case by an extension of this yard across the rear of the corner lot. This seems a very desirable expedient to avoid the use of alleys, yet getting a certain number of three-house groups into the plan.

The difference in appearance between the east and west tracts is so great as to deserve special mention. In the east development the houses are

semidetached and single in about equal proportions while in the west the great preponderance of buildings are groups of four and six houses. Use has been made of the same house designs for both developments, with the unfortunate result that the gabled porch already mentioned as too large is repeated so often that, looking down the street as one walks along the sidewalk, one sees very little else than slate and lattice. The bodies of the houses are quite lost to view and the spaces between them are entirely obliterated. Had sloping porch roofs been used instead of the gabled roofs the effects mentioned would have been much less apparent. As a matter of fact, none of the groups containing more than two houses has retained the simplicity of character so much to be desired. Strangely enough the rears of the four-house groups are appreciably better in appearance than are their fronts.

South Site.

Area planned: 115.62 acres. Housing planned: Detached houses, 123 families; semidetached houses, 376 families; row houses, 240 families; apartment houses, 86 families; total, 825 families.

(Project discontinued. For further information see tables, Chap. IX.)

The south site is directly south of the center of the city and is approximately 4 miles from either of the other sites and between them. It lies in the direction of the largest natural growth of better-class residences and was intended to serve the industries of the community generally. The topography of this site is generally rolling, and it undoubtedly would have been an exceedingly pleasing development. However, the south site never got beyond the plan stage.

All of the sites are intended for the occupation of rather highly skilled workmen and their families,

and, with the exception of the south site, are readily accessible by means of street railway service. It was intended, in the case of the south site, to revise the street railway lines leading in that direction and to do considerable construction on the streets outside of the city in order to make this part of the project convenient of access for workers.

All of the sites being outside of the city proper, it was necessary to construct all utilities, consisting of water-supply mains, sewers, electric lights, pavements, sidewalks, and other minor facilities.

It was practical, however, to connect both the water and sewer with the mains of the city of Erie, and particularly in the case of water advantageous arrangements were made with the city to bear part of the expense.

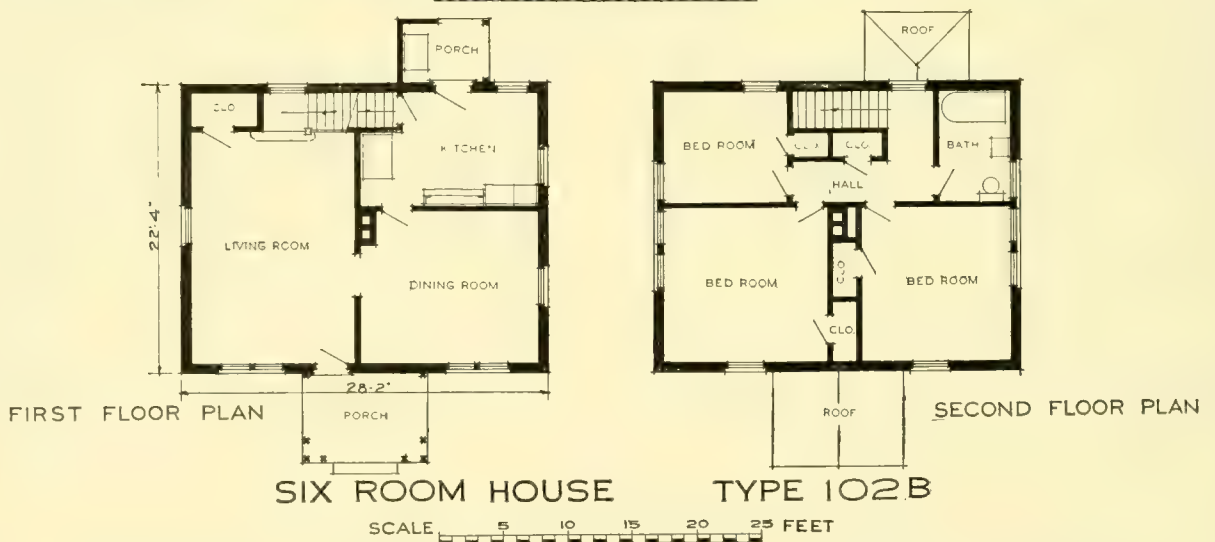
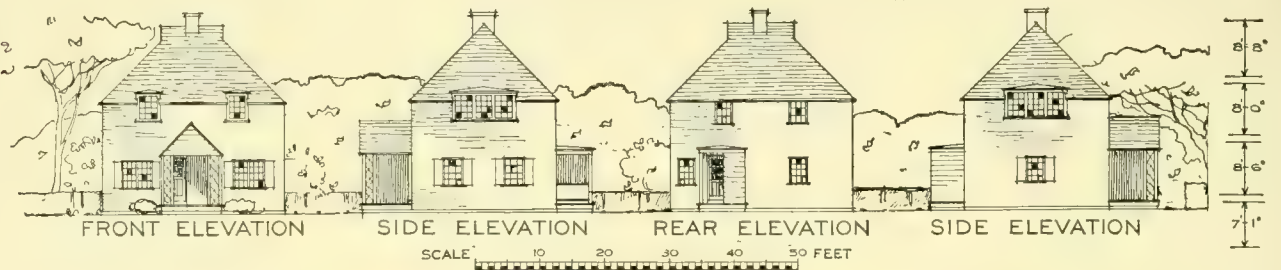
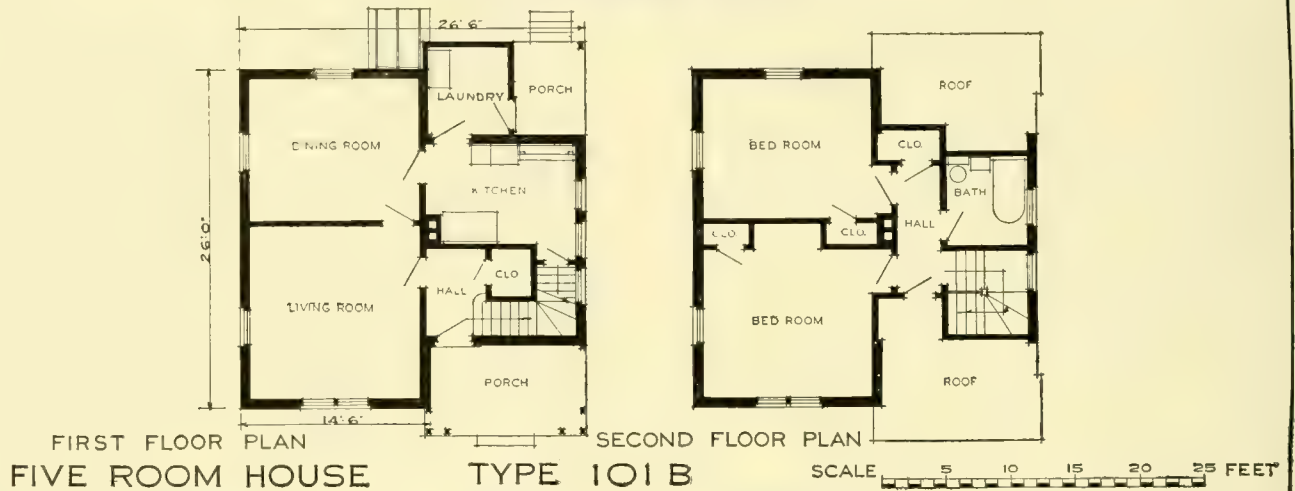
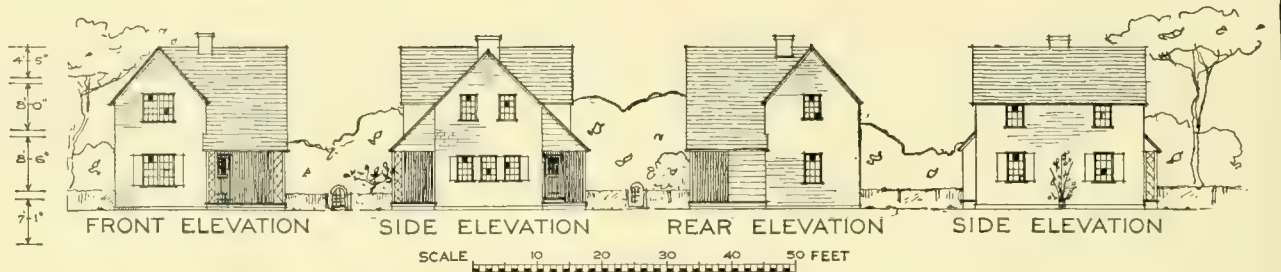
The sewers are of the separate system. The sanitary sewers in the case of the west site would have connected to a small private sewer; in the east site, to a sewer built by the General Electric Co. for their own development; and in the south site, to the city sewers. Ultimately all of the sewers would have been a part of the Erie system.

The city of Erie is served by two electric-lighting companies, one of which, however, does all the street lighting. This company contracted, without cost to the Housing Corporation, to extend its street-lighting mains and to install lights of the same character as those provided for the rest of the city. These lights are to be of the standard magnetite arc, and the Housing Corporation is to pay a yearly rental for them at the same rate as is paid by the city of Erie.

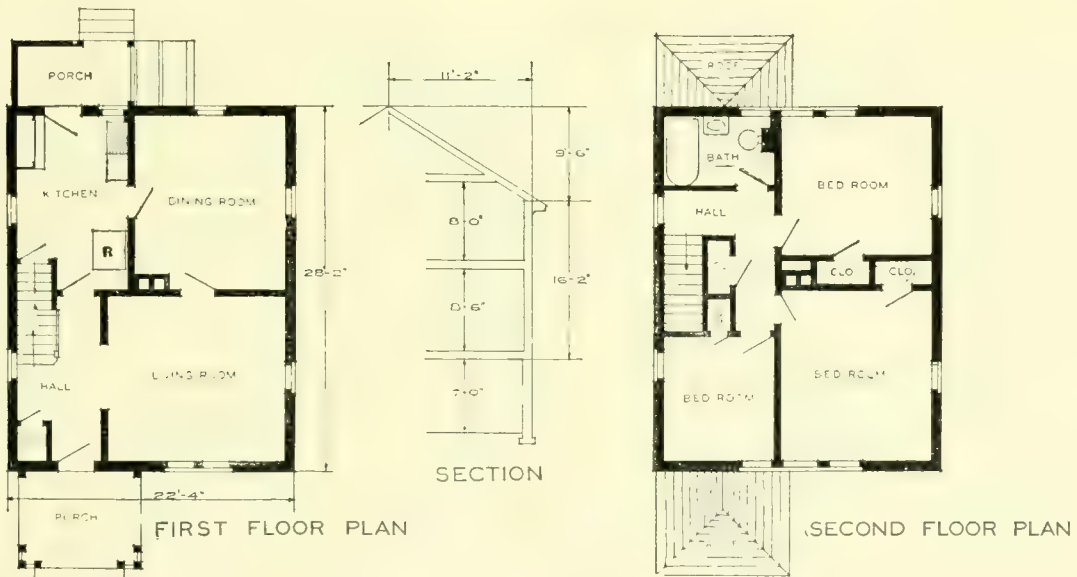
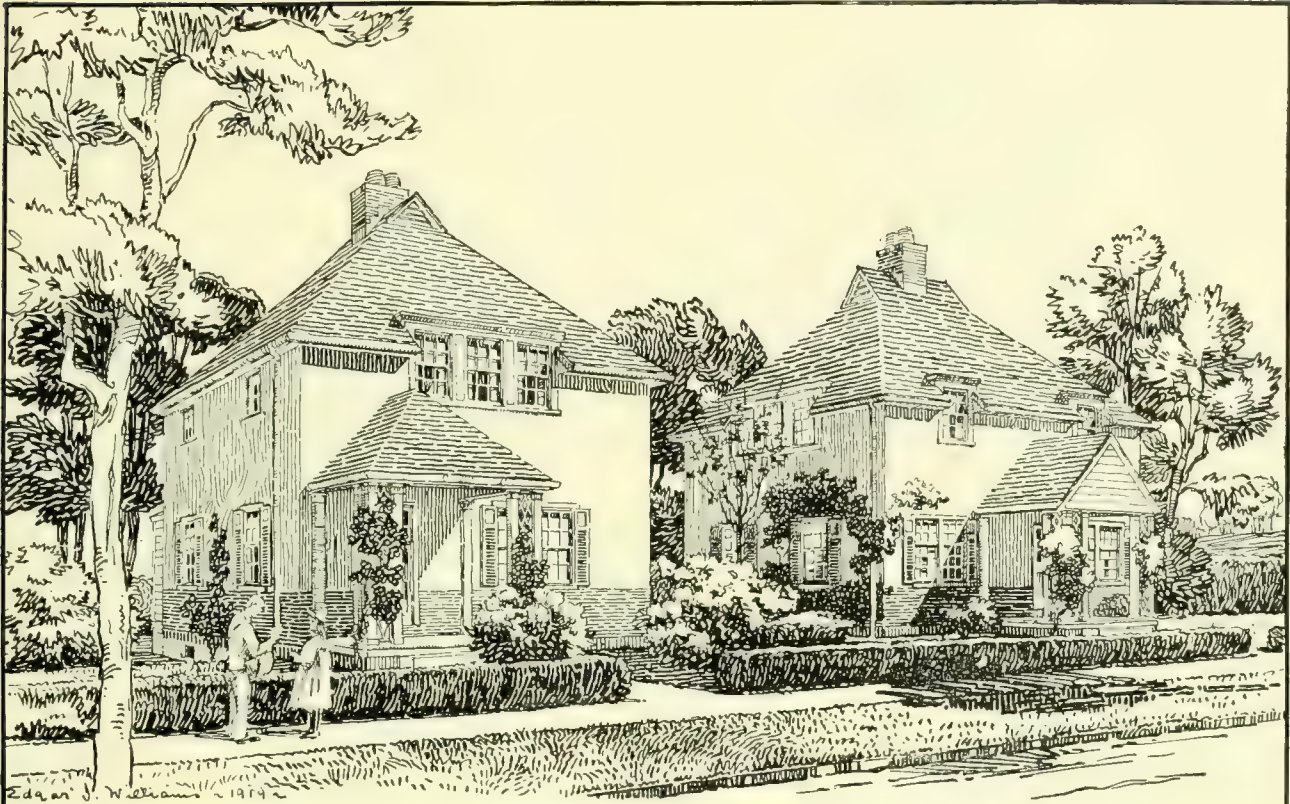
All street walks are to be of cement-concrete; house walks of gravel.

The street paving is to be purely of a temporary character, consisting of cinders of granulated slag to a depth of 6 inches.





UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT ERIE PA
ARCHITECT ALBERT H SPAHR

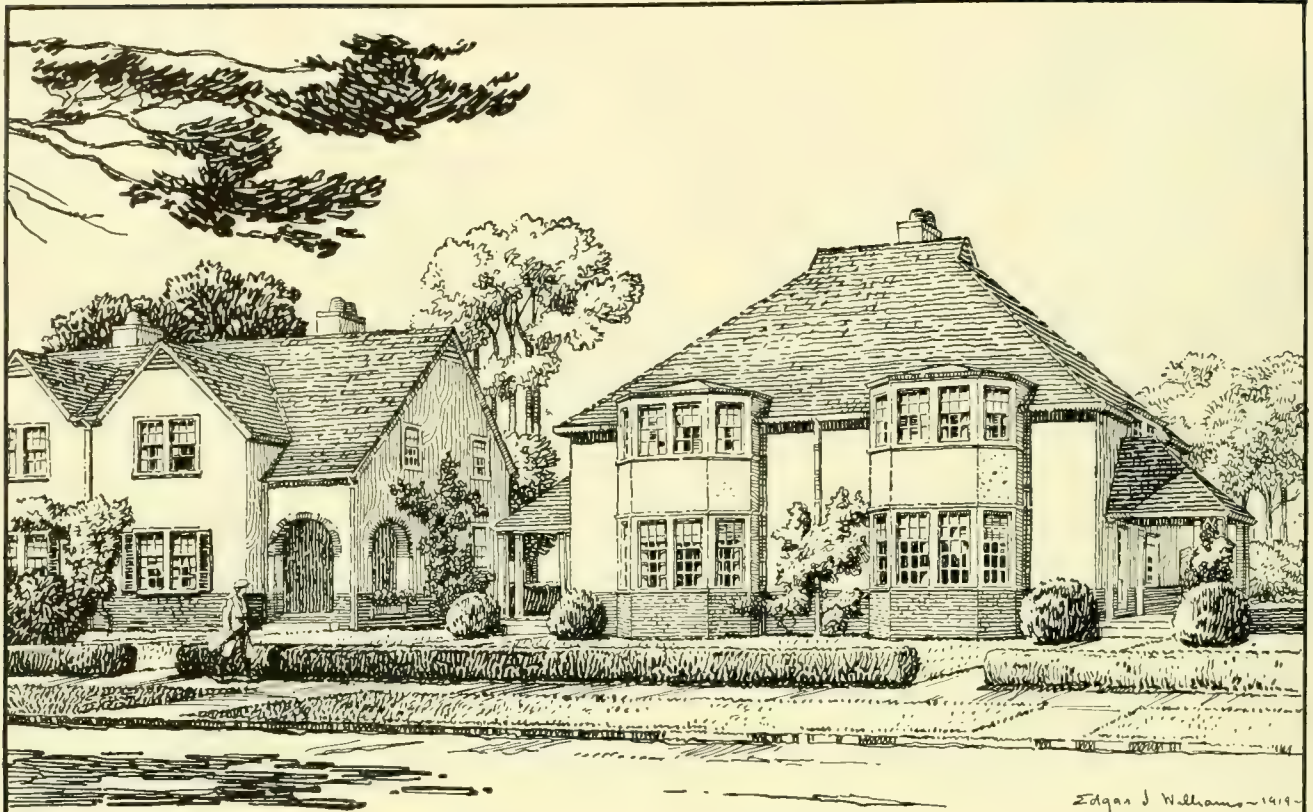


SIX ROOM HOUSE TYPE 103 B

SCALE 5 10 15 20 25 FEET

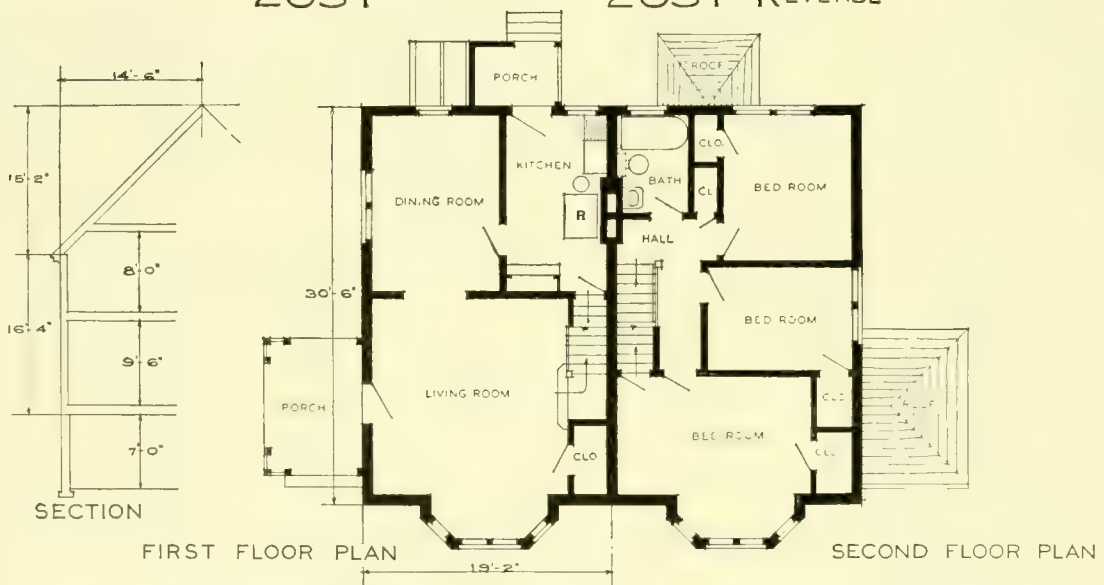
UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT ERIE PA

ARCHITECT ALBERT H SPAHR



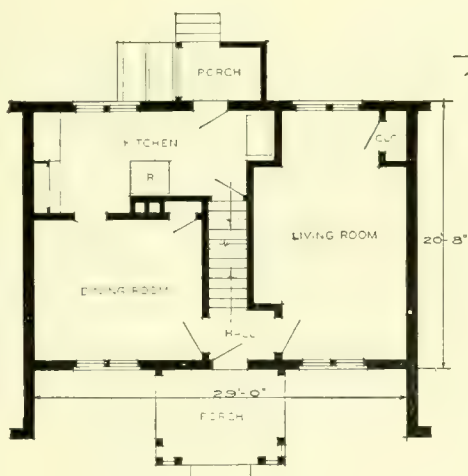
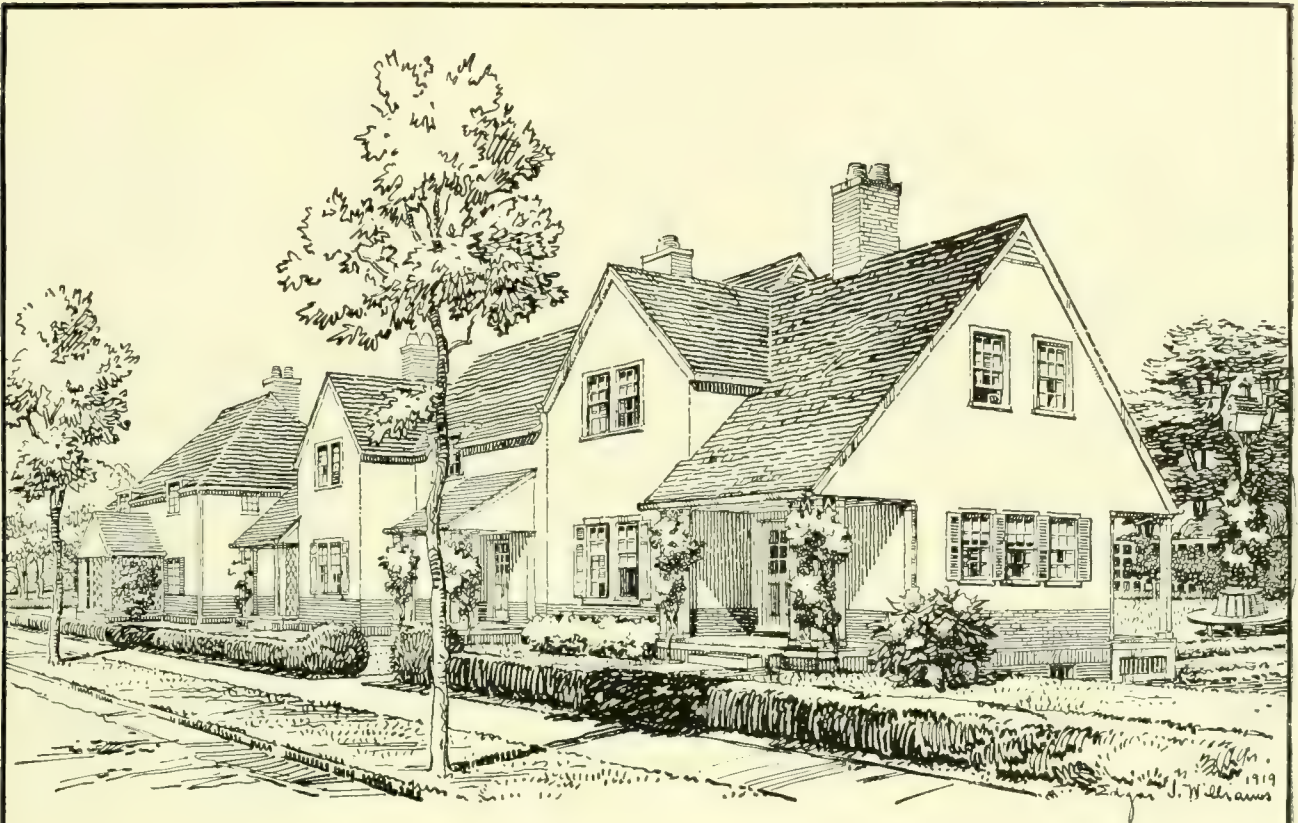
203 P

203 P REVERSE

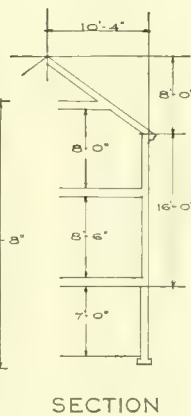


UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT ERIE PA

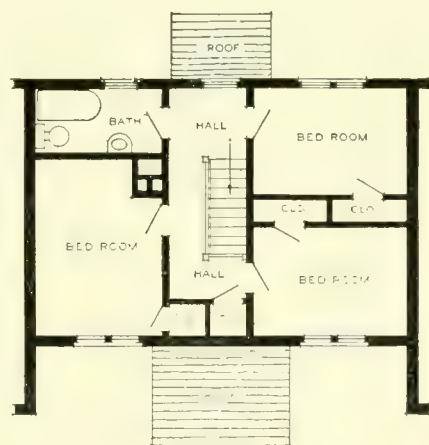
ARCHITECT ALBERT H SPAHR



FIRST FLOOR PLAN



SECTION



SECOND FLOOR PLAN

SIX ROOM ROW HOUSES

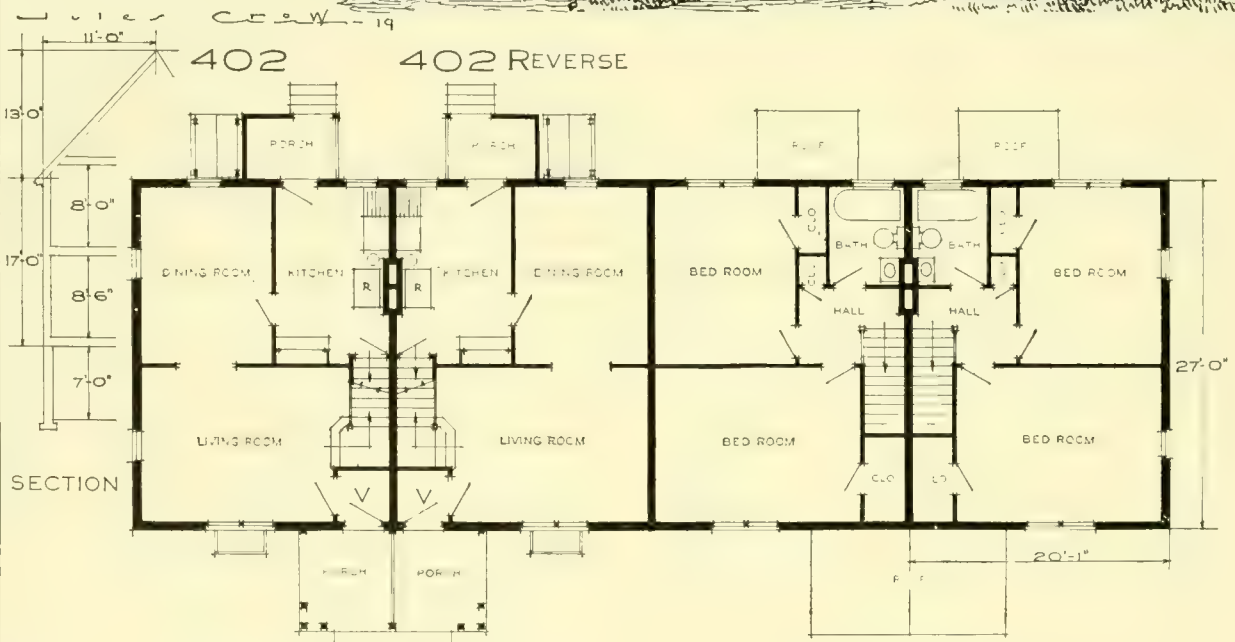
TYPE 301 P

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT ERIE PA

ARCHITECT

ALBERT H SPAHR

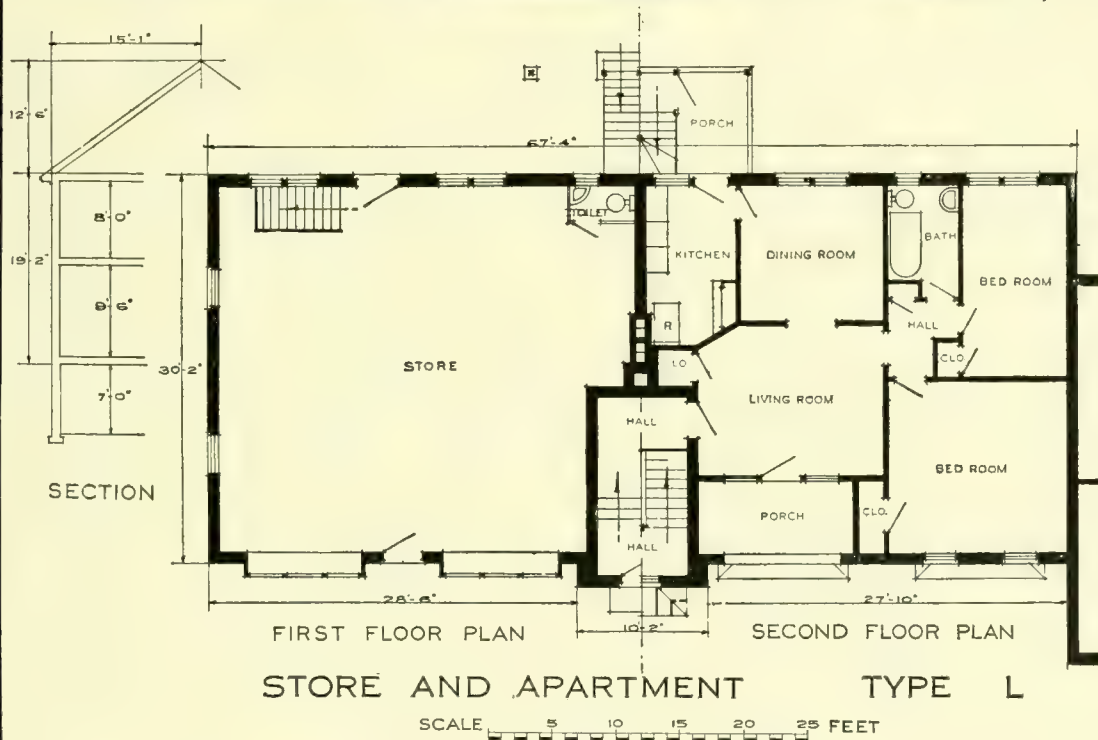
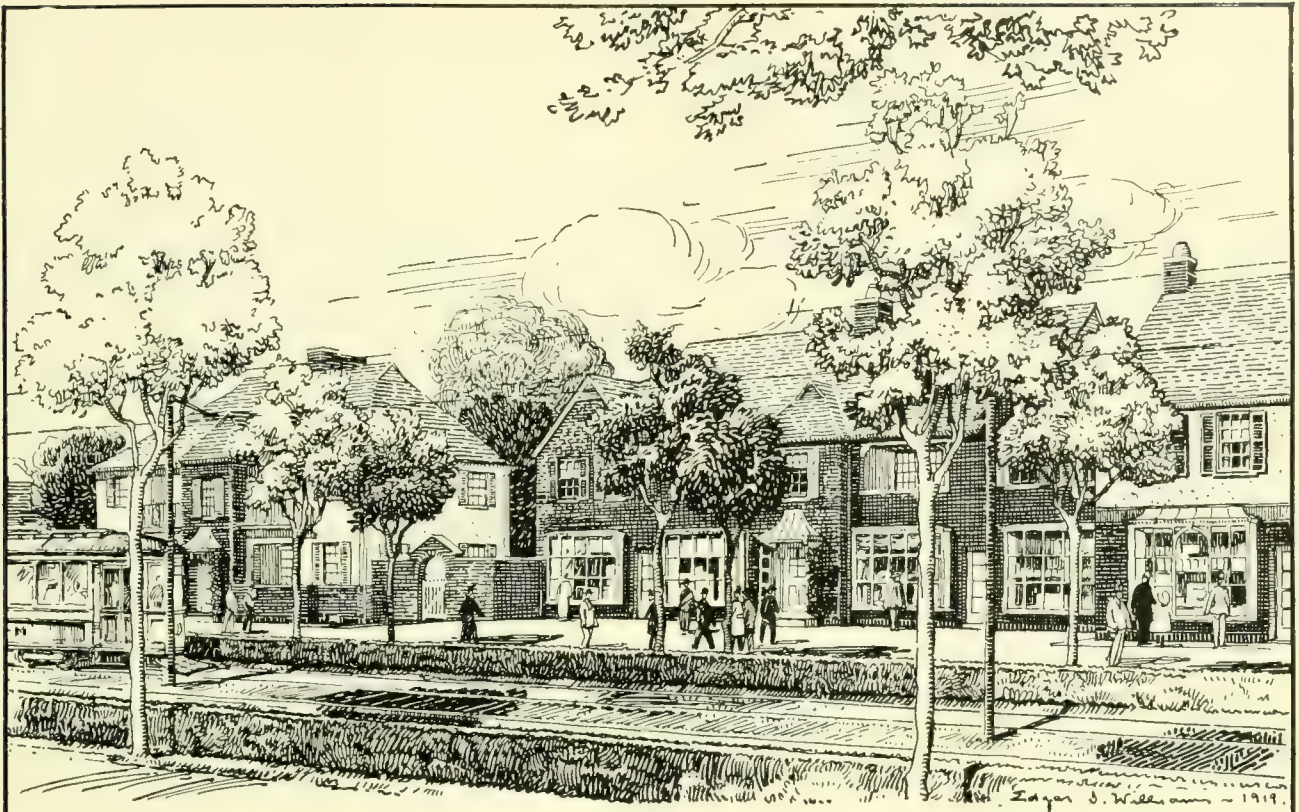


FIRST FLOOR PLAN SECOND FLOOR PLAN
FIVE ROOM ROW HOUSES TYPES 402 AND 402 R

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT ERIE PA

ARCHITECT ALBERT H SPAHR



UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT ERIE PA

ARCHITECT ALBERT H SPAHR

HAMMOND, IND. (PROJECT NO. 457).

Area planned: 19.55 acres. Housing planned and constructed: Detached houses, 86 families, 7 of these being in boarding houses; semidetached houses, 36 families, 4 of these being in boarding houses convertible into two semidetached dwellings each; row houses, 52 families. Total, 174 families. Seventy-eight single persons housed in boarding houses.

(For further information see tables, Chap. IX.)

Hammond, Ind., is in the center of a large manufacturing district, including the steel town of Gary, and East Chicago, Whiting, Holliston, etc. There are no visible lines of demarkation between these northern Indiana and adjacent Illinois towns, in fact the sanitary and utility problems are very closely united. The population within the corporate limits of Hammond was approximately 30,000 in 1918. There is a very large foreign element in the population.

The Standard Steel Car Co. and the works for the Ordnance Department are located near the west edge of the city of Hammond. While the general transportation both by interurban electric cars and by steam line was not particularly insufficient throughout the northern Indiana industrial district, the Standard Steel Car Co. was poorly supplied by any transportation for workmen.

The United States Housing Corporation was instrumental in making several improvements in transportation in the Hammond district. A special train was put into operation on the "Nickle Plate" Railroad between the Standard Steel Car Co. plant and Englewood, Chicago, with no expense to the Housing Corporation.

A loan of approximately \$315,000 was made by the Housing Corporation to the Hammond, Whiting and East Chicago Railway Co. to enable them to undertake six separate sections of track construction, and to buy 10 double-track four-motor passenger cars.

Orders were placed for these cars, which are now under construction. The work on the additional trackage and repairs as specified in the contract is well under way.

When the construction is completed, it is believed that with the new cars, the joint operation over the tracks of the two street car lines in Hammond, and the routing of cars to avoid the down-town district of Hammond, all traffic congestion will be eliminated.

There were no particular problems, for the time being, in housing the common labor of the foreign type, who were quite willing and even preferred to

live in the cheaper type of buildings, such as barracks or tar-paper covered shacks of their own construction. The difficulty was to meet the more serious problem of providing a home and living quarters for skilled mechanics of the higher grade.

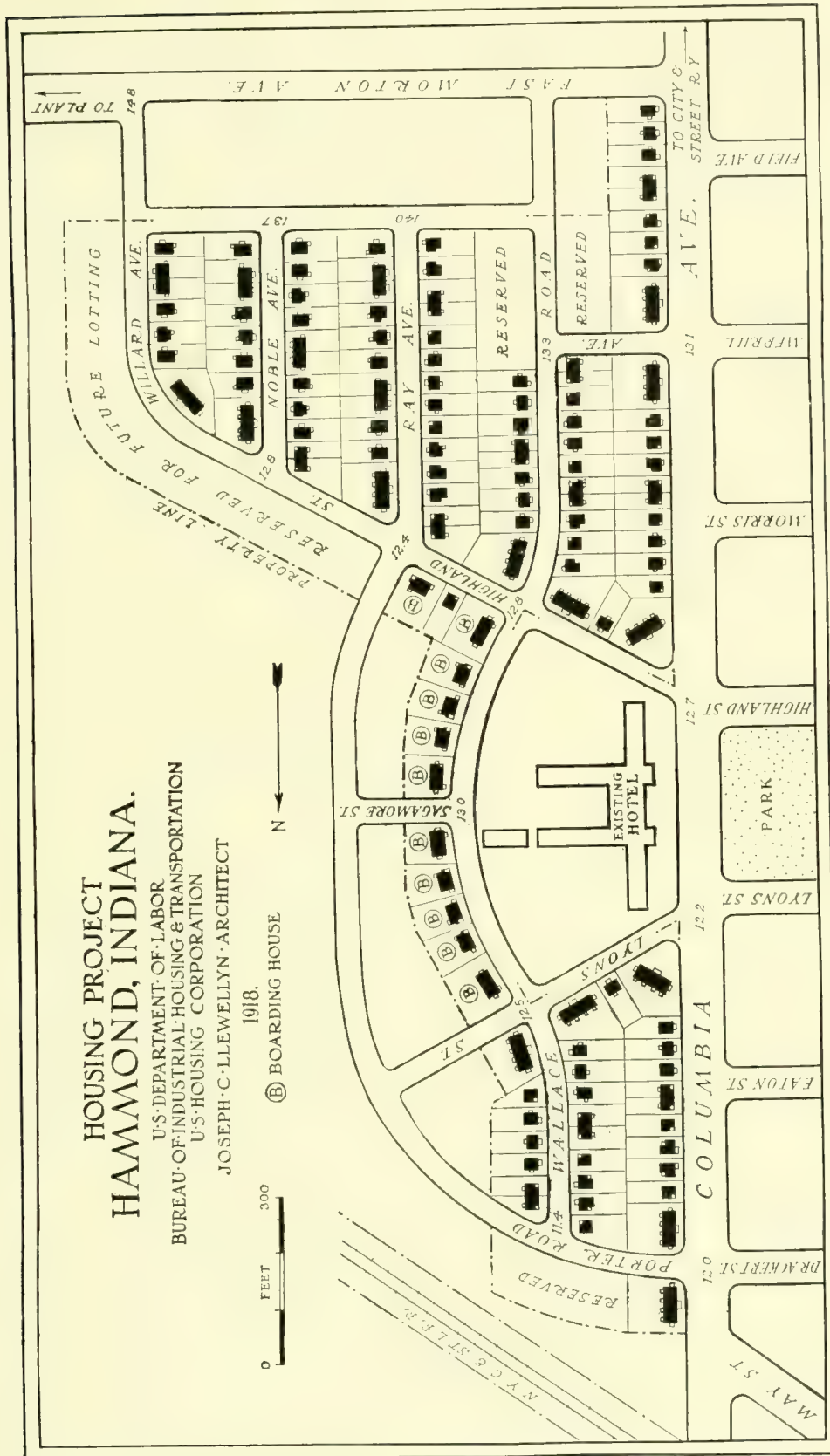
The housing development at Hammond was started as a private proposition by the Standard Steel Car Co. For several years prior to the war this company had operated a housing development for common labor on land adjacent to the housing site with which the housing corporation was later concerned. This private development consists of some three blocks of large two and three story wooden tenements closely crowded together, without any pretension or effort at attractiveness in appearance, surroundings, or particular cleanliness.

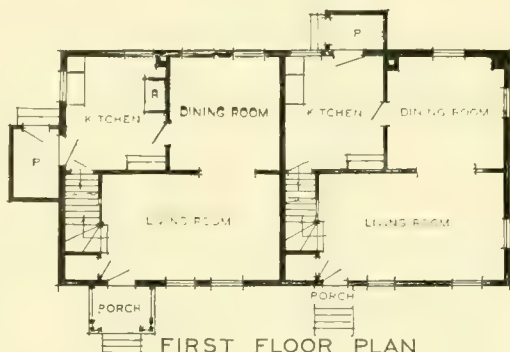
At the outbreak of the war the Standard Steel Car Co. was awarded a contract by the Ordnance Department involving the construction of shrapnel and 9-inch guns. The car company undertook to make provision for the increased number of war workers. The Ordnance Department assisted in the planning of the housing and there appears to have been some understanding with the Ordnance Department as to future Government assistance.

Early in the summer of 1918 the Standard Steel Car Co. had completed the erection of a large brick hotel building and the construction of concrete paved sidewalk, the necessary grading, and a system of combined sewers upon the selected tract of land, just north of their above-mentioned tenement houses and adjacent to the car company's plant.

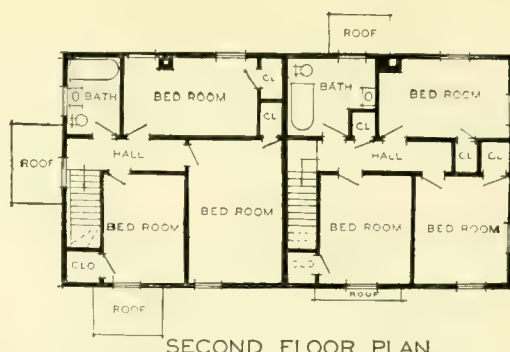
The Hammond development is located adjacent to a main thoroughfare known as Columbia Road and in close proximity to the car works. It is half or three-quarters of a mile from any store centers. The surrounding territory to the east is sparsely covered with small newly-built houses put up by real estate speculators.

The buildings occupied by workmen of higher order, in and about Hammond, consist mainly of one and two story frame detached houses and bungalows. The prices of these ran from \$2,200 to \$5,000, including land.





FIRST FLOOR PLAN



SECOND FLOOR PLAN

WHEN CONVERTED TO SIX ROOM SEMI-DETACHED HOUSES

SCALE 5 10 15 20 25 FEET

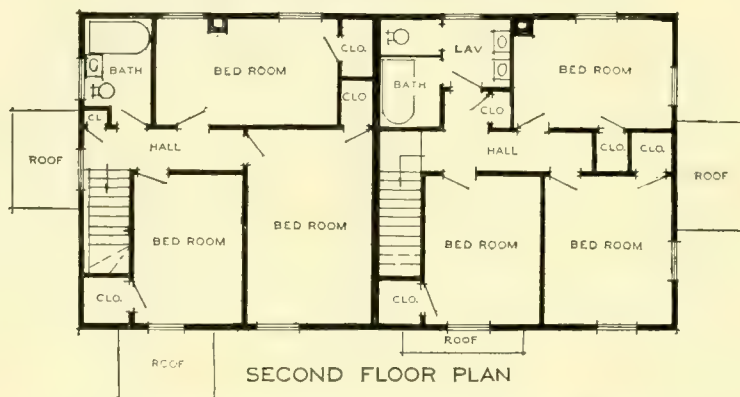


FRONT ELEVATION

SIDE ELEVATION

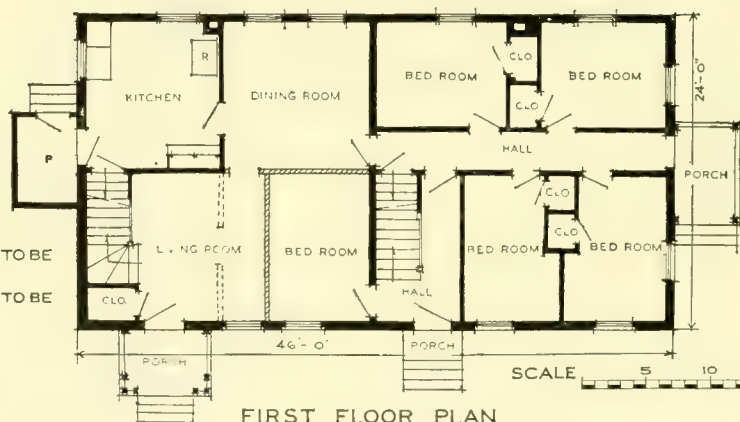
REAR ELEVATION

SCALE 10 20 30 40 50 FEET



SECOND FLOOR PLAN

TO ENLARGE DINING ROOM
 ——— INDICATES PARTITION TO BE
 REMOVED
 INDICATES PARTITION TO BE
 ADDED



FIRST FLOOR PLAN

SCALE 5 10 15 20 25 FEET

FOURTEEN ROOM BOARDING HOUSE TYPE G
 CONVERTIBLE TO SEMI-DETACHED HOUSES

UNITED STATES HOUSING CORPORATION

DEVELOPMENT AT HAMMOND IND

ARCHITECT

JOSEPH C LLEWELLYN

The ground of the housing site is slightly rolling and very little above the elevation of Lake Michigan, so that surface water is close to the ground and drainage is a serious problem. The soil, except for a few inches of black loam, is water-bearing sand and quicksand.

The water supply at Hammond is under municipal ownership and management. The city, at its own cost, installed all the water mains required for the housing development. These mains were laid sometimes in the street, but generally at the rear of the lots.

A system of combined sewers was built by the Standard Steel Car Co., consisting mostly of vitrified pipe laid in water-bearing sand which required the use of well points for installation.

Likewise, the Steel Car Co. graded up and laid a complete system of paving within the development. This paving is of a very high grade, 20 feet in width, of concrete with combined curb and gutter. Concrete sidewalks were built adjacent to the curbs. Contrary to the practice throughout this section of the country, no alleys were provided for in the rear of the lots.

Hammond and the adjacent territory is supplied with gas and electricity by the Northern Indiana Gas & Electric Co. Prior to the war it was the universal custom for this company, as well as all gas and electric companies, to extend their mains and make house connections free of charge to prospective customers. The financial conditions brought about by the war were particularly severe on these private utility companies. The demand for their services maintained itself or even increased, but the fixed rates before established by the public utility companies of the State did not increase to meet the pace of the rapidly rising cost of labor, cast-iron pipe, and other materials. In the neighboring State of Illinois this condition was recognized in part by the State Utilities Commission, which commission passed an order in 1918 requiring consumers to pay for these house connections. While no such provision was made by the Indiana Public Utility Commission, the Northern Indiana Gas & Electric Co. insisted that extension of mains to the house connections be paid for by the consumers, although the company agreed to reimburse the consumer in five annual payments. Protests were filed with the Housing Corporation at Washington against this action of the public utility company, maintaining that this action of the company

stopped a very considerable amount of house construction of the cheaper grade of workmen's dwellings. As a result of negotiations between the representatives of the United States Housing Corporation and the Public Service Co. of Northern Indiana, extending over a period of several weeks, it was finally agreed that the Northern Indiana Co. would, with the assistance of the War Finance Board, issue its notes to the extent of \$17,000 and would install for the Government, within the Hammond Steel Car Co.'s development, all of the mains and house connections free of charge.

Inasmuch as the mains for water, gas, and electricity, and sewerage to some extent were located at the rear of the lots, and as the town plan provided no alleys, contrary to the usual custom, there immediately arose the question of providing in a legal and satisfactory manner for both parties an easement for these utilities.

The mayor of Hammond agreed to waive, in behalf of a Government war development, the general local preference for alleys and local customs of garbage collection, providing adequate legal right of way was granted for the water mains which the city had installed. The Northern Indiana Gas & Electric Co. have insisted on a written right-of-way agreement for the installation of their gas mains and pole lines. A form of agreement providing for a 12-foot easement was prepared by the Legal Division of the United States Housing Corporation to meet this peculiar condition.

The first impression one gets of this project is its sombreness, due to the fact that all the wood-covered houses are stained gray instead of being painted in the colors generally applied to clapboards. All the roofs, too, are of one color—green—this covering being asphalt shingles. There are a few red brick houses, but even these as well as the white trim of the houses do not greatly improve the dullness of the effect as a whole. A great improvement would result if color were introduced.

We have here four type plans of two-story houses (three six-room and one seven-room), also semi-detached houses and bungalows, all so developed as to produce different elevations. There are also boarding houses. The plan types are quite sufficient in number to give interest, and the exteriors are harmonious, the grouping giving variety without any feeling of unrest.

The project has not been rigidly subjected to the rulings of the War Industries Board, for here we have

window-box details of good construction, a good quality of trim and flooring, and cold-air returns to the furnaces covered with metal register faces instead of the comparatively flimsy wood lattices used elsewhere.

The exterior design of these houses is exceedingly simple, the cornices and overhangs of roofs and porches being sufficient, yet not too heavy. The

windows as a rule are larger than is usually found in houses of this type, giving to the rooms a maximum of light and ventilation. Kitchens and living rooms are of good size, the fixtures being well placed and not the least cramped. The general aspect of the houses on the long streets is pleasing, especially the variety introduced by the curving streets.



ILION, N. Y. (PROJECT NO. 578).

Area planned: 17.11 acres. Housing planned: Detached houses, 90 families; semidetached houses, 40 families; total, 130 families; 168 single workers in convertible dormitories.

(Project discontinued. For further information see tables, Chap. IX.)

Ilion is about 12 miles east of Utica, N. Y., on the West Shore Railroad, while the adjoining town of Herkimer is on the New York Central, with sidings not much over a mile from Ilion. The Erie Canal passes through the town. The prewar population was 10,000. The war contracts of the Remington Arms Co. and the Union Metallic Cartridge Co. had increased the population to over 13,000, making housing conditions intolerable.

The town while distinctly industrial has a population almost entirely American. There are among the workers great numbers of young women from the farming districts of New York State. To obtain all the labor possible from the near-by towns, the Housing Corporation arranged for a special workmen's train on the West Shore Railroad of the New York Central Lines between Ilion and Canajoharie, this seeming to make accessible the largest amount of existing housing within a reasonable distance on one line. This train was started in operation on October 28, 1918, and was discontinued on December 21, 1918.

In addition to such other measures of relief as were possible, it was decided to build houses also. Two sites were at first proposed, one for dormitories for girls, on low land three-fourths of a mile south of the works, and another, originally for dwelling houses, on high land to the west of the works and only about 400 feet farther away. The first site on further examination by the designers was found to be impracticable owing to bad drainage and negro neighbors. All operations were therefore confined to the second site and an extension thereto, the two together making about 17 acres.

This land is high, quite level, with just sufficient fall for drainage, and has about 6 inches of topsoil, with gravelly and clay subsoil. There is no car line at hand, but the walk to the works (three-fourths of a mile) is a pleasant one through residential districts. There are sufficient stores and schools in the vicinity but very poor recreational facilities, some of which however were to be increased at the expense of local capital assisted by the Ordnance Department, the Y. M. C. A., and the Y. W. C. A. The surrounding development is

residential of medium class merging into a rural district and farms.

Building materials could be delivered from the Erie Canal, the New York Central, and the West Shore Railroads, all three with terminal facilities within a mile.

More than half the area had already been subdivided, with streets dedicated, partly graded, and utilities partly installed.

Circulation not already secured is completed by the proposed plans. Adaptation of the streets to the topography was not under the circumstances the governing factor in the layout, but rather the extension of the lines of streets already proposed into the increased area made necessary by the abandonment of the site first proposed for dormitories.

But two types of street were planned—Fifth Avenue, 75 feet wide, and Ward, Woodland, and Cross Streets, 50 feet. Fifth Avenue was to have a central grassed and tree-shaded strip 20 feet wide, bordered by two 16-foot roadways, planting spaces 4 feet 6 inches, sidewalks 5 feet, and hedge allowance 2 feet. The 50-foot streets were to have central roadways 24 feet in width, 8-foot planting strips, and 5-foot sidewalks on either hand and no hedge allowance.

The street planting was to be shade trees in planting spaces between walk and pavement, spaced about 40 feet apart.

The Fifth Avenue frontages were to be hedged and the central "green," which is only 20 feet wide, was to have Lombardy poplars, for which variety of tree there is room but for hardly any other. Informal groups of shrubbery were to be planted in the front yards of some of the lots only, to be examples for future owners to follow. The development of the backyard gardens was to be left to the householders.

Alleys were quite skillfully avoided. These were not needed for the detached and semidetached houses, but for the so-called "convertible dormitory" buildings—a structure designed to be used at first for dormitories for girls but so arranged that it could be changed at slight expense to a row of

three houses—it was necessary to provide means of access by team to the rear of the central house of the row. This was accomplished by placing the “convertibles” in every instance on corner lots so that a drive to the central house of the row could enter from the side street.

There were eight houses on the tract which were not disturbed. Their location affected the grouping and design of the new buildings.

In general the houses near the ends of blocks are nearer the street line, with a setback of 25 feet. Those toward the middle of the blocks have a 30-foot setback. Interest is added to the grouping by alternating semidetached and detached houses toward the center of blocks.

The corner lots for the “convertible dormitory” buildings average 110 by 100 feet. When “converted” the middle house of each row will have a front yard 20 feet wide, its rear yard flaring to a width of 60 feet, rear land being taken from the end house lots for the purpose. Semidetached houses have lots with a frontage of 30 to 35 feet and an average depth of 115 feet. Detached houses have lots with an average frontage of 40 feet, corner lots in general 50 feet and an average depth of 115 feet.

There are no public grounds within the immediate limits of the tract unless one so regards the strip of “green” in Fifth Avenue, which is 20 feet wide and 900 feet long. It is to be noted, however, that to the westward of the site the land is now all open fields, also that more adequate recreational features, including suitably designed and located playgrounds, are being provided elsewhere by other interests.

No pavements were to be installed. The roadways were simply to be graded to a width of 24 feet, which was practicable on account of the natural good gravel soil, and were to be oiled. Cement sidewalks were to be built. Because of the fact that the site selected was in the immediate vicinity of the built-up part of the town, the utilities required were not expensive. The sewers could be connected directly to existing lines. The town is sewered on the separate system and has an ample and carefully filtered water supply. The town also owns its electric lighting system, which it extends without cost to the consumer, and in the same manner the gas mains which are owned by a private utility company are freely extended. All of these utilities are in the immediate vicinity of the site, and extensions could be made with practically no loss for dead or unused mains. The town of Ilion was so desirous of aiding the Government in every

way that the electric mains were extended even before the Government was ready for them and had been constructed at the time the project was abandoned. An adjustment was made, therefore, with the town because of this work.

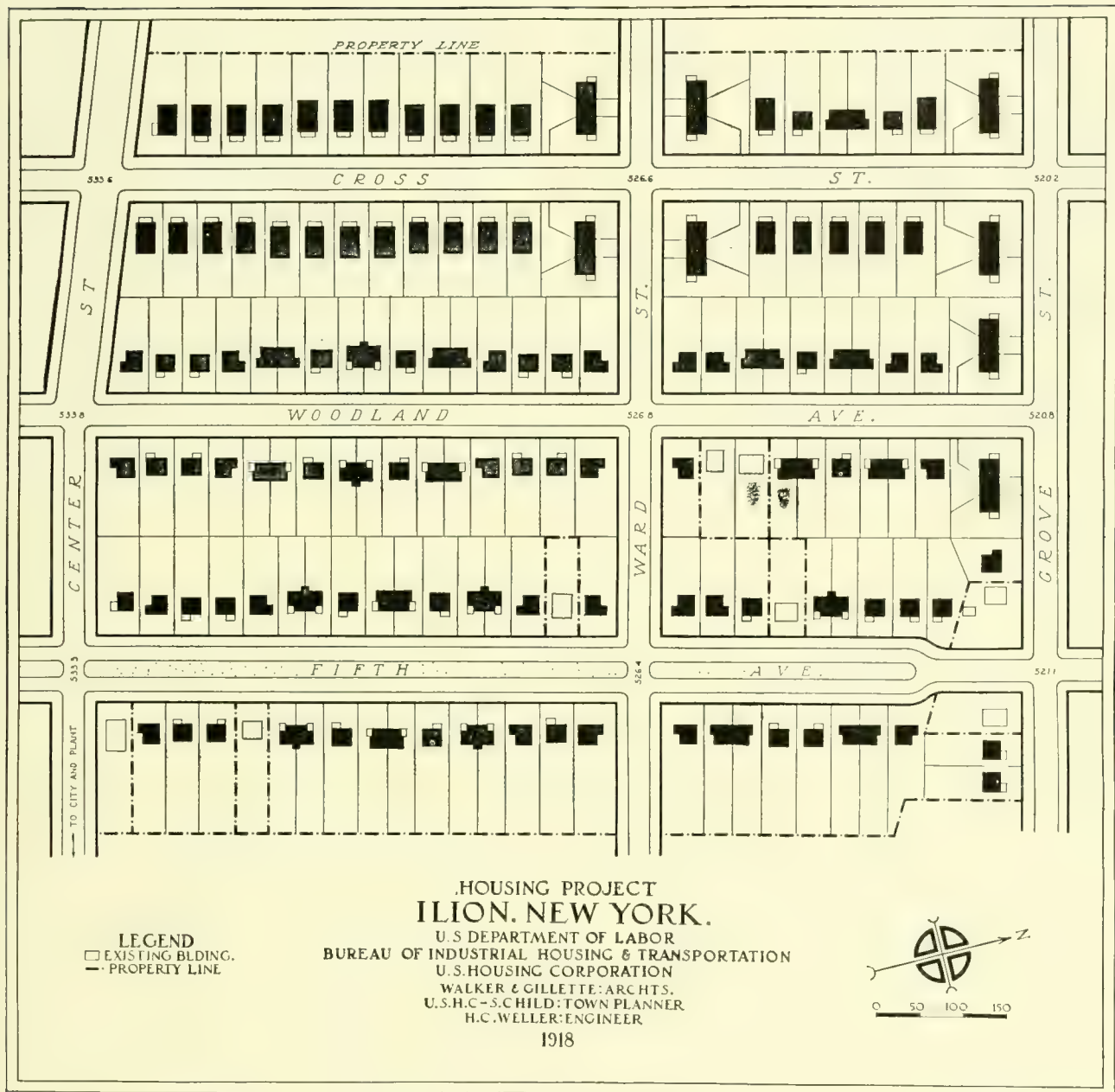
The people of Ilion, through their officials, were desirous of paying for everything that they possibly could pay for. Thus they were to construct the water mains, sewer mains, and the electric lighting mains at their own cost and without charge to the Government, saving some \$25,000 to the Housing Corporation. The gas mains also, though owned by a private corporation, were to have been installed without any expense to the Government, and thus this project, which would probably have housed 130 families and 168 working girls, would have been completed at a cost for utilities of only about \$25,000.

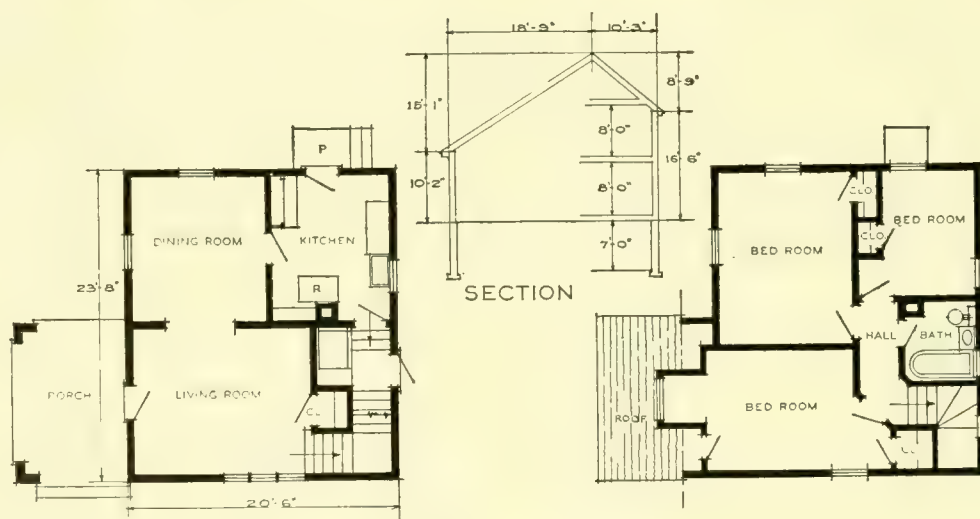
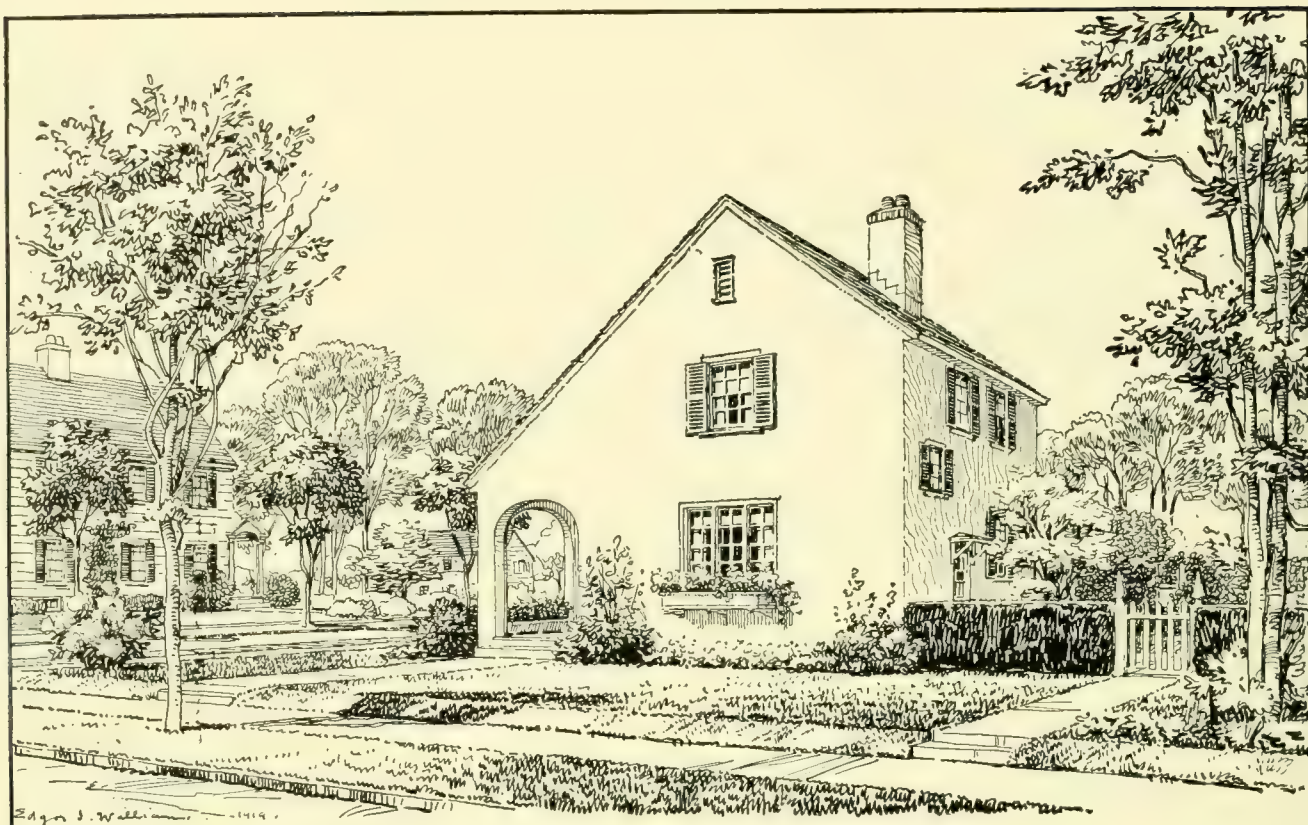
Not only this, but the Remington Arms Co. and certain men of the village were preparing to establish recreation centers—that is, the extension of a Y. M. C. A. and Y. W. C. A.—and in every way endeavored to help the Government in its desire to provide pleasant homes for the workers.

While the war demand was to house many single workers as well as families, it was decided to build only the types of house that would be normally absorbed by the population after the period of congestion. The problem, therefore, was not to construct a community as in some of the larger projects, but to fill out the existing town with desirable houses.

As the sites were laid out in a manner not calling for large groups of houses, a diversity of design of the houses was made to give architectural interest and meet differing future demands. Of the houses planned three-fourths were of six-room types, most of these being detached single family houses. Eleven types were used. There is wide variety also in the arrangement of rooms and stairs. While this variety has been carried to the limit of advisability, study of the relation of the houses one to another was made so as to insure a harmonious architectural effect. Particular study was made of the design of the projecting porches. Stucco surfaces or wide clapboards were used for the exterior walls, wood framing and plaster for the interior walls.

With the signing of the armistice the whole project was canceled, as the war need was over. The question of peace need was not directly in the province of the Housing Corporation.





FIRST FLOOR PLAN

SECOND FLOOR PLAN

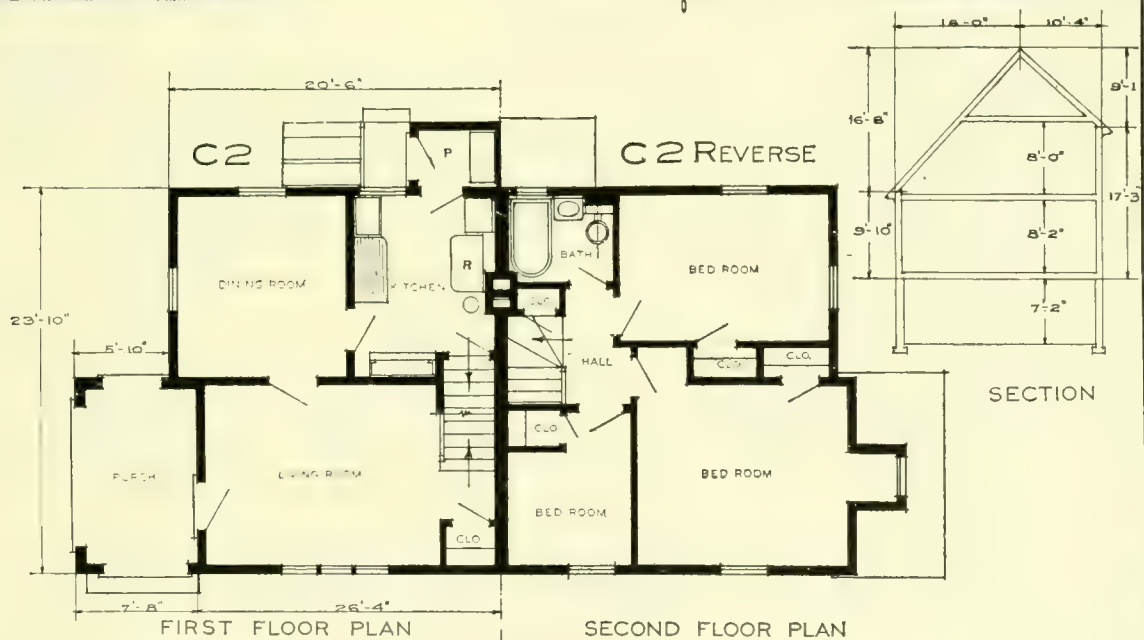
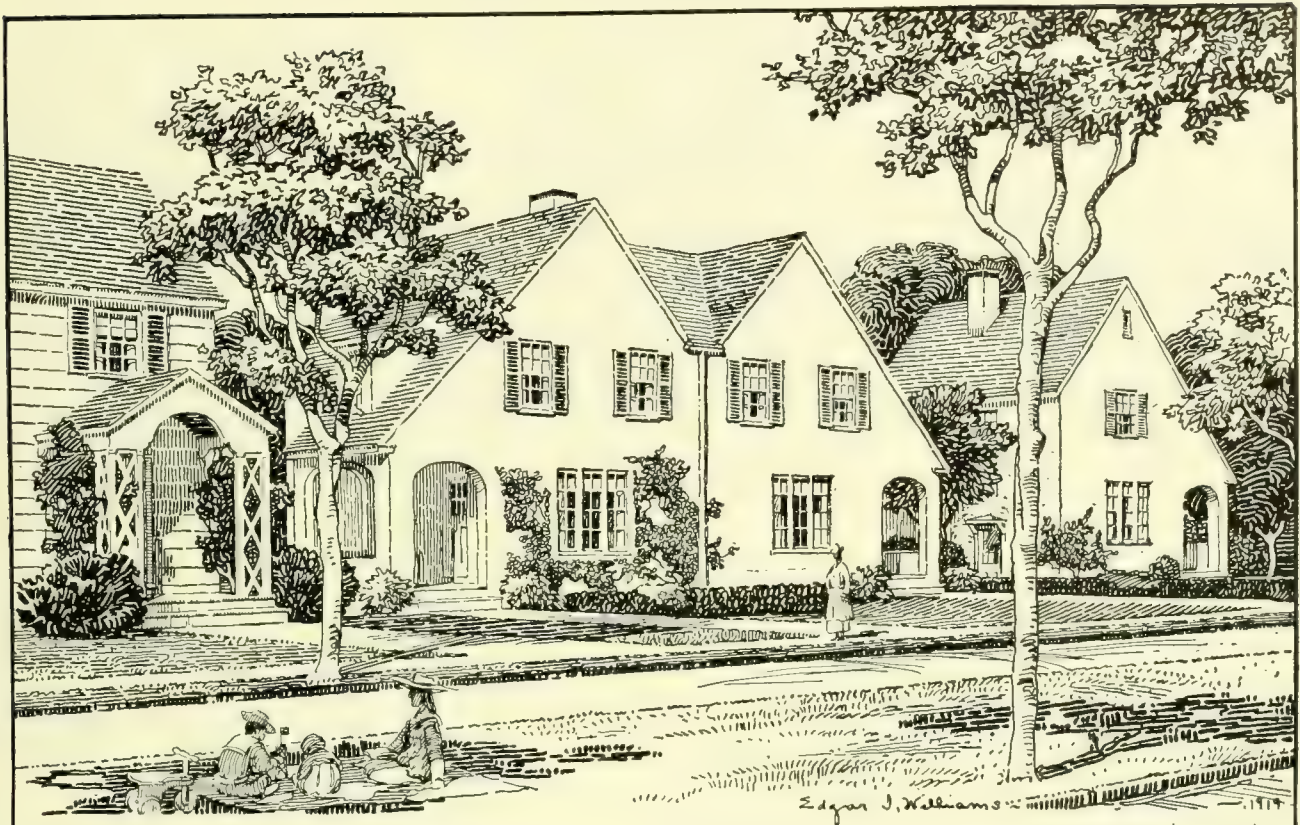
SIX ROOM HOUSE TYPE B 2

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT ILION N Y

ARCHITECTS

WALKER AND GILLETTE

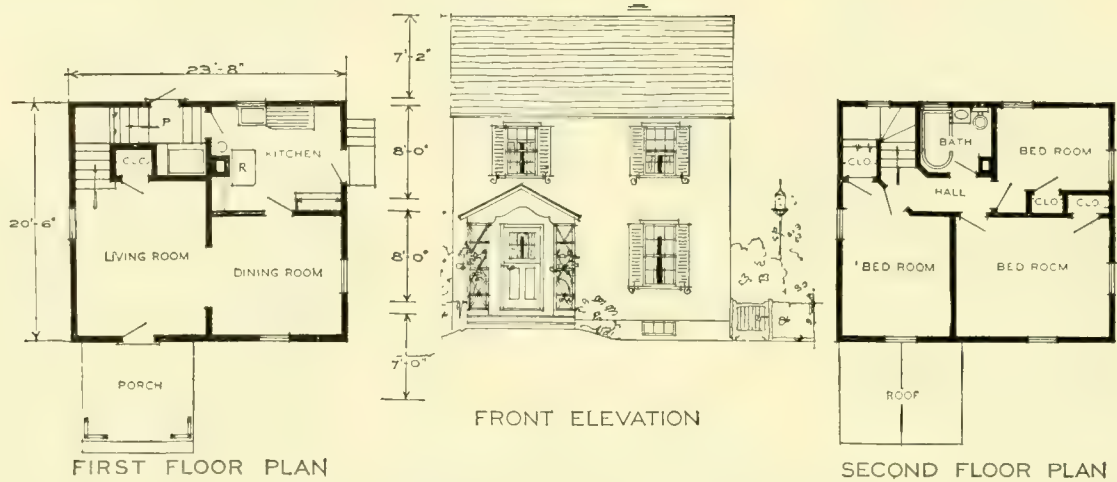


SEMI-DETACHED SIX ROOM HOUSES TYPES C2 AND C2 R

SCALE 0 5 10 15 20 25 FEET

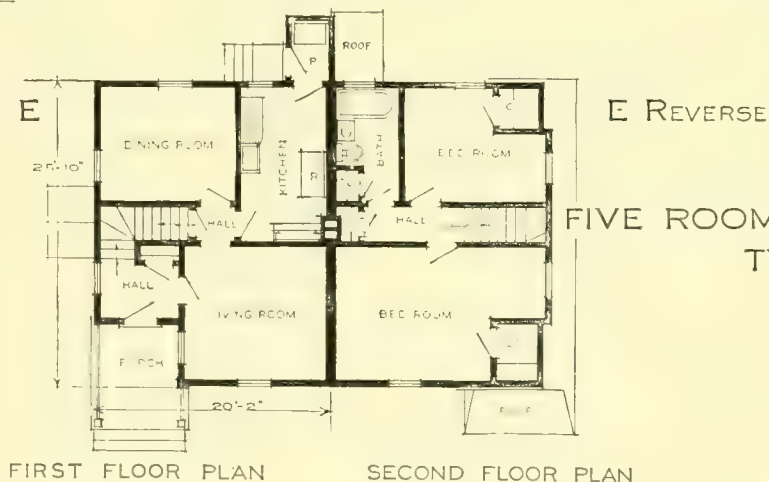
UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT ILION N Y

ARCHITECTS WALKER AND GILLETTE



SIX ROOM HOUSE

TYPE B3

FIVE ROOM SEMI-DETACHED HOUSES
TYPES E AND ER

SCALE 5 10 15 20 25 FEET

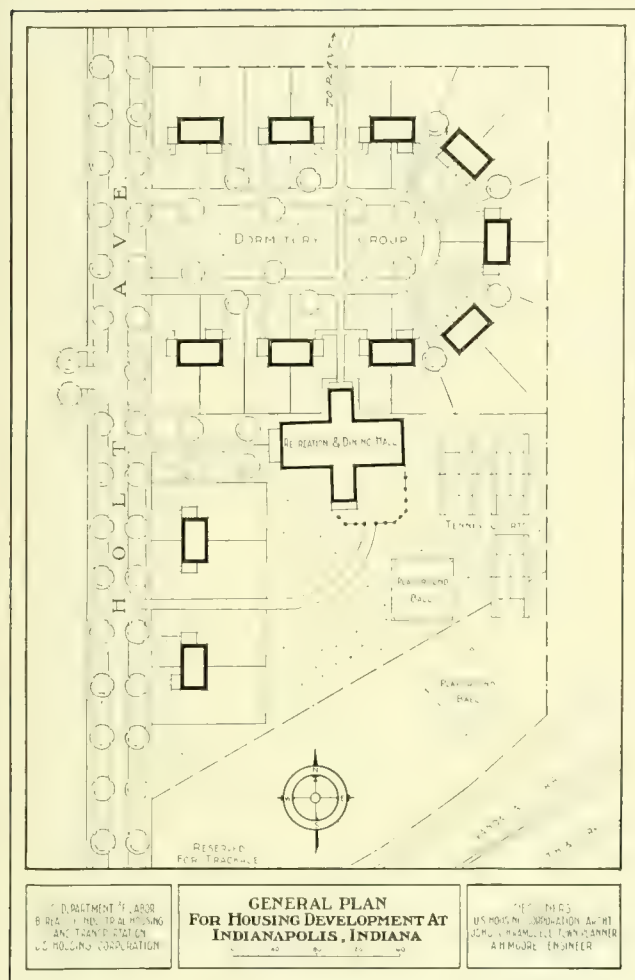
UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT ILION N Y

ARCHITECTS WALKER AND GILLETTE

INDIANAPOLIS, IND. (PROJECT NO. 1314).

Area planned: 3.85 acres. Housing planned: 198 persons in convertible dormitories.

(Project discontinued. For further information see tables, Chap. IX.)



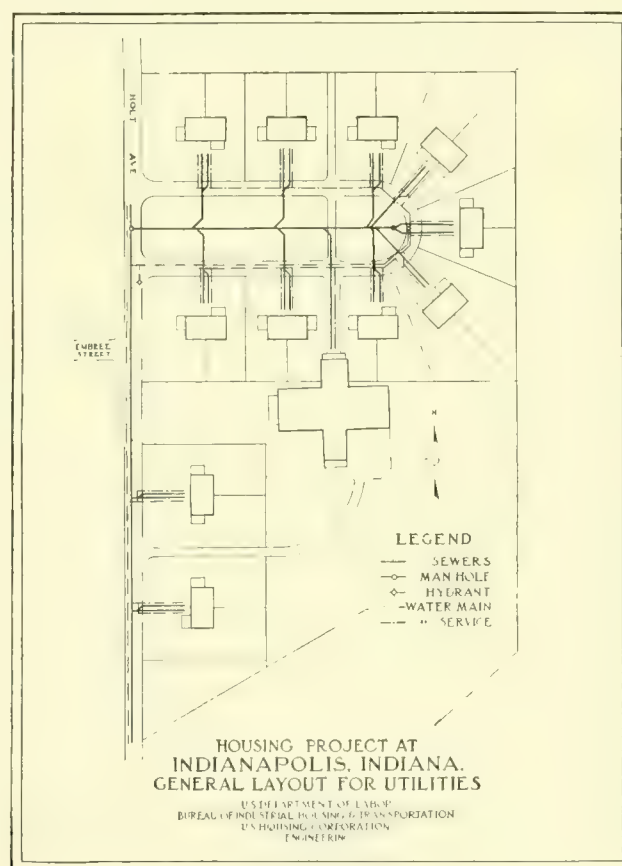
The Stenotype Co.'s factory, which was engaged during the war in the manufacture and loading of small bombs for aeroplane and trench use, is located at Mars Hill, which is a suburb 5 miles from the center of Indianapolis, owned by the Greater Indianapolis Industrial Association as a private venture and an adjunct to the activities of the association. Three thousand lots have been plotted, but only about 100 small houses have been constructed.

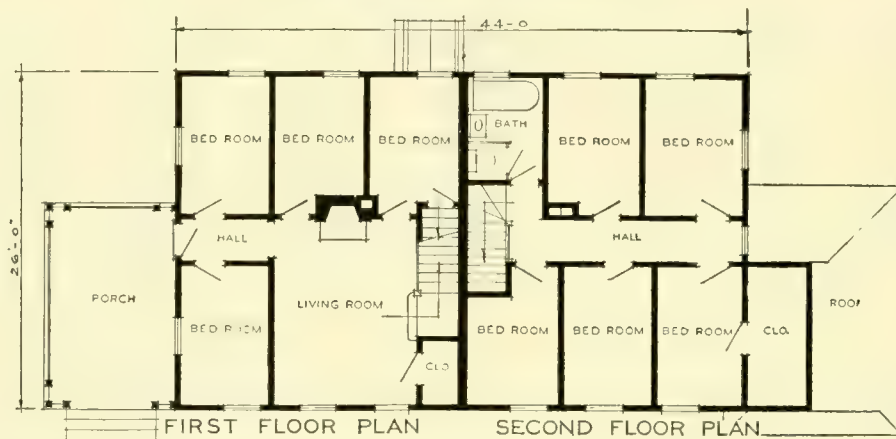
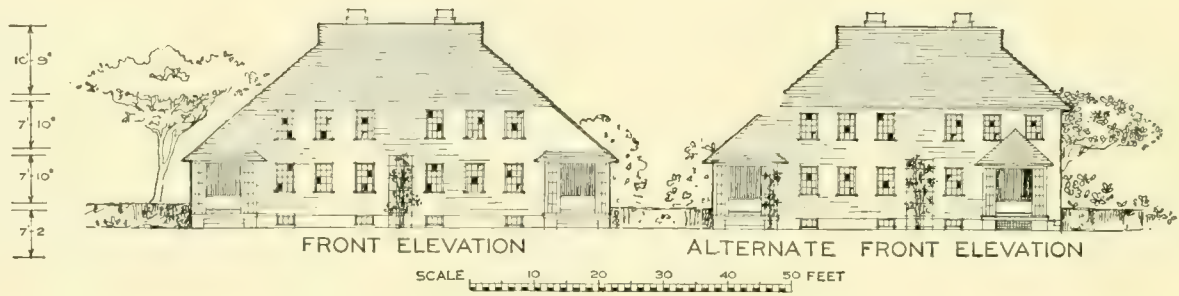
The Stenotype Co. employed about 1,200 women, who came mostly from the surrounding country, from homes of some refinement, and who had gone into the work as a war duty.

The housing facilities in the neighborhood of the factory being poor and the transportation to

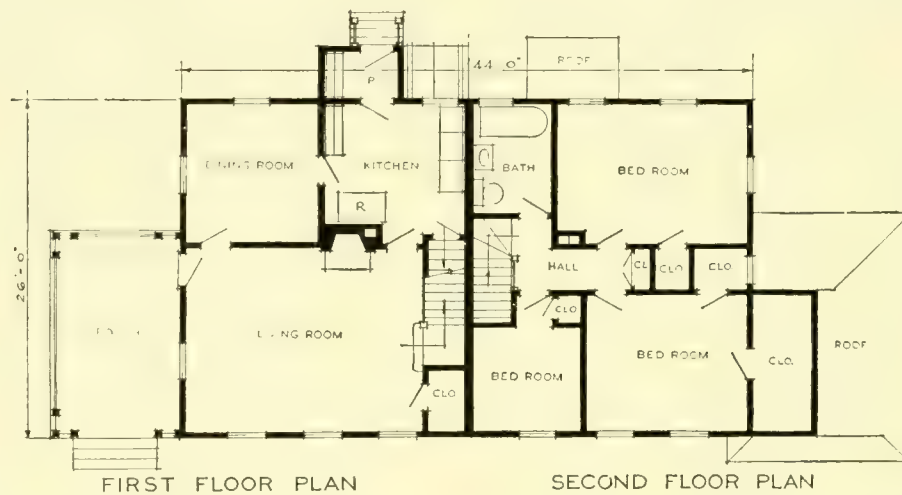
Indianapolis being inadequate, it was difficult to keep sufficient help. The Housing Corporation, having been appealed to and having investigated the situation, chose a site of about 6½ acres on the level land within 500 feet of the factory. On this site there was a large barn, exceptionally well built as a fancy stock barn. This site had been reserved by the Industrial Association for factory purposes, but there was no serious objection to it for war-time residential uses. The barn was to be remodeled as a cafeteria and clubhouse. The housing provided was to be in dormitories, each convertible into two semidetached houses.

For better appearance and greater compactness, these buildings were to be arranged around a court, the open space serving as a general recreation ground. The general contract had been let and work was proceeding when, on the signing of the armistice, the project was abandoned.





TWENTY ROOM DORMITORY U S H C TYPE A
 CONVERTIBLE TO SIX ROOM SEMI-DETACHED HOUSES



DORMITORY U S H C TYPE A
 CONVERTED TO SIX ROOM SEMI-DETACHED HOUSES

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT INDIANAPOLIS IND

U S H C

INDIANHEAD, MD. (PROJECT NO. 496).

Area planned: 180.80 acres. Housing planned: Detached houses, 146 families; apartment houses, 44 families; total, 190 families; temporary dormitories, 1,400 persons. Housing constructed: Detached houses, 100 families; temporary dormitories, 99 persons.

(For further information see tables, Chap. IX.)

The proving ground and the smokeless-powder works of the United States Navy are both located at Indianhead, a peninsula at the junction of Mattawoman Creek and the Potomac River, 25 miles south of Washington on the Maryland shore. There is a straggling village of about 40 houses here, located mostly on land owned by the Navy Department. The smokeless-powder works occupy about 600 acres, south of Charles County Road, extending for three-quarters of a mile to Mattawoman Creek. The gun proving is carried on from emplacements and other equipment on the river front near the older dock. Headquarters and official residences of the commandant and his principal assistants are near by.

When the Housing Corporation first became concerned with the project there were three kinds of workers needing housing. First, there were the permanent employees of the powder works, about 1,100, over 400 of them being skilled mechanics, chemists, and the like; the remainder common laborers, a large number of whom were Negroes. Over half of these permanent employees were married, and the existing housing conditions were such that many of them came daily by jitney or otherwise from points 15 or 20 miles away. This permanent force was to be increased to 4,000 within a year. Second, there were the men permanently employed in the proving of guns: 175 civilians and something over 200 enlisted men, including officers. Third, there were the laborers employed in constructing an addition to the powder works, about 1,000, mostly single men living in temporary bunk houses, nearly half of them being Negroes.

For the housing site there was chosen about 180 acres of Government-owned land within three-quarters of a mile of both the powder works and the proving ground. The site is a partly wooded upland, north of Charles County Road, averaging 100 feet above the Potomac, well drained and fairly level. The western portion is indented by several steep-sided ravines, heavily wooded. A small rectangular street development had already been started upon the bits of level woodland lying between these ravines and north of Charles County

Road. East of this was the area to be newly developed, although the scheme included completing the grading and utilities for this earlier development also. The existing utilities installed by the Navy could be readily extended into the new work.

In the matter of water supply there is some departure from the ordinary situation in that it was necessary to install a double system of water mains, for fire protection and domestic consumption. The reason for this is that the powder factories require such a large amount of pure water which must be obtained from artesian wells that the amount left for domestic consumption is limited. Potomac River water, however, could be obtained in large quantities, and as the powder factories require a large and high-powered fire pump outfit, this could easily supply the fire protection for the houses also. Building materials can be delivered conveniently, being received from the Government-owned railroad and switch tracks less than half a mile from the site. These connect with the docks at the river and cars are brought by Government-owned tugs on car floats from the Washington Navy Yard. A 14-mile branch connecting Indianhead with the Pennsylvania system is under contract.

Charles County Road crosses the Government reservation from east to west, running nearly level and about 100 feet above the Potomac, which borders the reservation at the north and west.

Just outside the reservation and south of Charles County Road are the few stores, the post office, and a bank. Not far away is a church and a very inadequate school building. Other than the straggling village, the area for miles around is farming land, corn and tobacco being the principal crops.

After investigation and consultation in detail with the Navy officials concerned, the Housing Corporation planned for the following facilities: (a) Post office, to be built by Navy Department; (b) school; (c) 100 or more detached houses with ample yards, for homes for skilled workers in the powder works, some of whom it was expected would take at least one boarder; (d) eight or more four-family apartment houses of a type already in use in

the little village, for skilled workmen with small families; (e) six or more dormitories for single men, 34 to a building, for unskilled labor of powder works; (f) two large brick barrack buildings of a type selected by the Navy Department, to be occupied by marines; (g) several acreage lots to be developed in the future as homes of commanding officers and administration officials; (h) a fire station; (i) a band stand.

The design of the new development is simple. On the available area nearest to the powder plant and proving ground, but removed from the through public road, was placed the "village green" surrounded by houses, and connected with the previous housing scheme. The green occupies the broadened upper portion of the little valley which farther to the west becomes a wooded ravine. At the lower western end of the green, and so in the center of the whole development and well connected with all parts of it, are the post office and fire station. A large tree which was saved between these two buildings furnished a chance for variety and interest without making the road scheme any less practical. At the eastern end of the green on a gentle knoll is the school, next to the playground. The main architectural structures of the scheme are thus concentrated in one composition for usefulness and for appearance as well.

The rest of the upland between the rectilinear scheme of the green and the river bluff is more uneven. It is laid out in gently curving roads fitting the rolling ground surface and giving lots increasing in size as they get farther from the village center.

All the streets except Earlesway are 50 feet wide. The pavement in most cases is 18 feet in width; hedge allowance, 2 feet; sidewalk, 4 feet; planting strip, 10 feet. Earlesway has a total width of 70 feet with a central mall 14 feet wide, 16-foot roadways on either hand, bordered by 6-foot tree lawns, 4-foot walks, and 2-foot allowance for hedging. The roads and walks are built of local gravel with road oil. Street trees in the planting strips are approximately 40 feet apart.

Lots facing the village green are to have privet hedges on the street line and on division lines as far back as the house lines. Sample lots, 10 in number, are to have shrubbery groups; and 7 other lots are to have sample orchards to encourage the lot holders to develop their own places. Most lots

have a frontage of 75 feet and a depth of from 150 to 200 feet.

All the steeply sloping land of the ravines and bluffs, most of which is now covered with beautiful forest growth, including oaks, gum trees, holly, and native shrubbery, is to be set aside for a natural park.

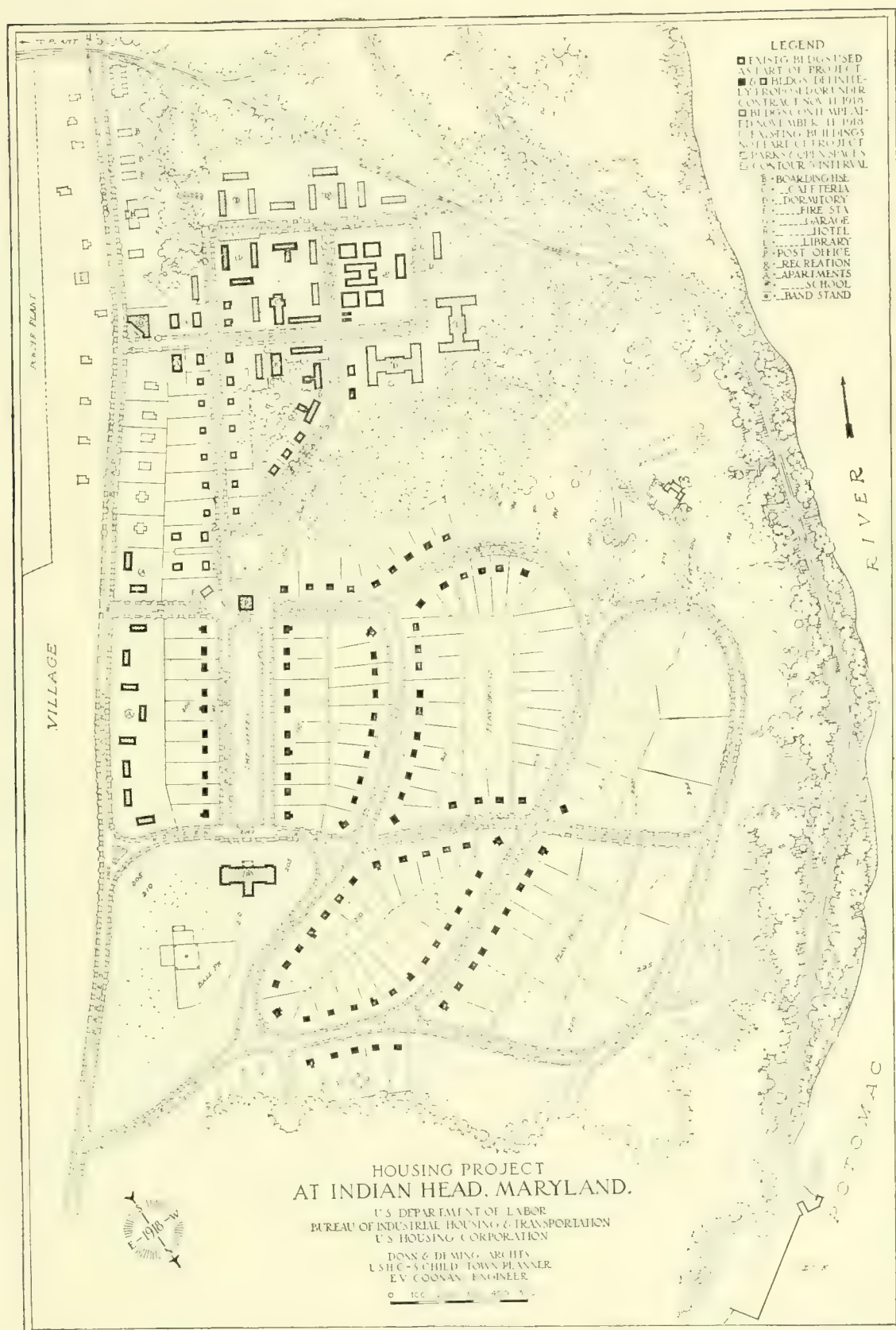
The only houses constructed are detached six-room houses of two different plan types, from corporation standards. There are four different exterior designs. These houses are constructed of frame with all side walls of shingles and all painted white. The roofs are covered with slate-surfaced asphalt shingles, in some cases green and in others reddish-brown. Slight changes in appearance have been given the houses by varying the designs of the porches and by painting the outside blinds different colors.

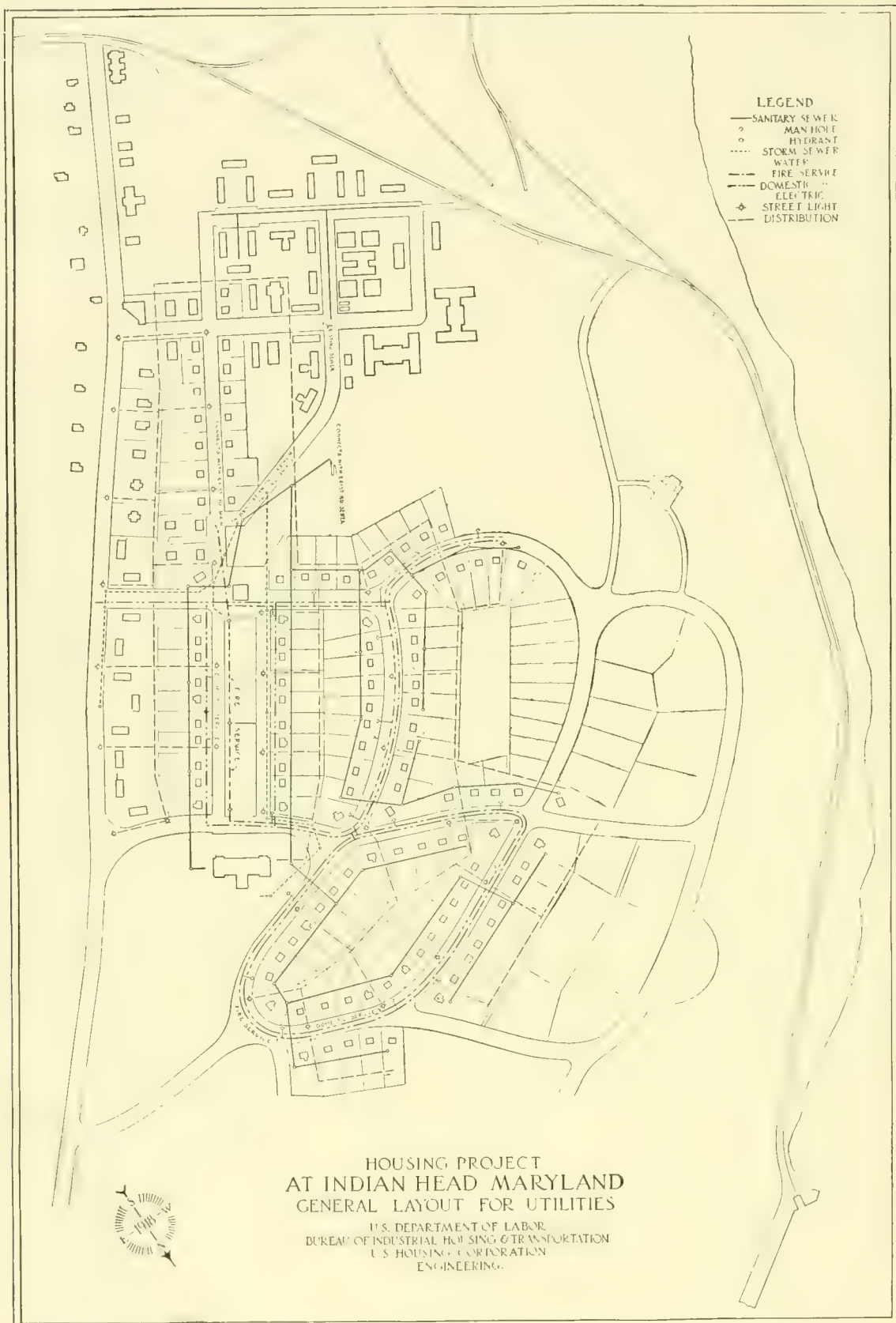
Viewing the project as a whole, we find too much similarity. The houses individually are of good design though somewhat stilted in appearance—a fault which could readily have been overcome by making the front windows of the second story somewhat less in height and lowering the roof.

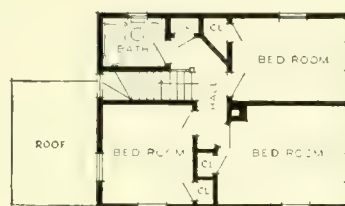
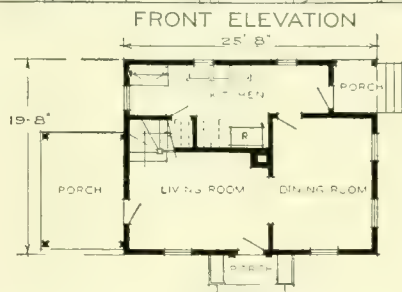
Referring to other projects, where more varieties of exterior designs have been used, we see with certainty how much better the project would look if some of the houses were of a more distinctly different type—if, for instance, a gambrel-roofed house had been introduced at certain points. Then, too, an improvement would have resulted if, instead of all houses being white, some of them had been of different tone.

The dormitories are the corporation's standard type.

Rigid economy in the expenditure of funds necessitated the abandonment of the well-conceived schoolhouse first designed, the central hall of which (the village hall) was to have had for its motif the south façade of Mount Vernon. This would have been a far more fitting, not to say beautiful, terminal building for the village green than the present structure. Then, too, the first plans for the post office at the other end of the green were abandoned for a cheaper design prepared by the Bureau of Yards and Docks, the Navy Department furnishing the funds for this building. As the village green was designed with these two buildings as first planned particularly in view, there is a material loss in effect.



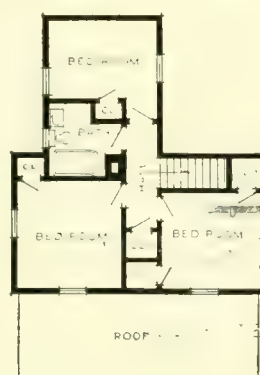
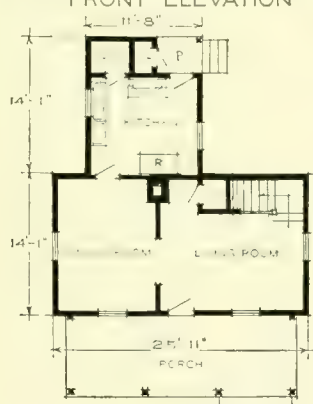




FIRST FLOOR PLAN

SIX ROOM HOUSE

SECOND FLOOR PLAN
TYPE A8



FIRST FLOOR PLAN

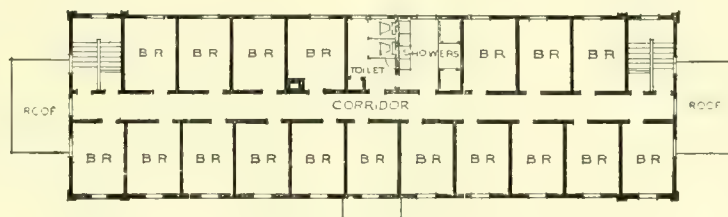
SIX ROOM HOUSE

SECOND FLOOR PLAN
TYPE B1

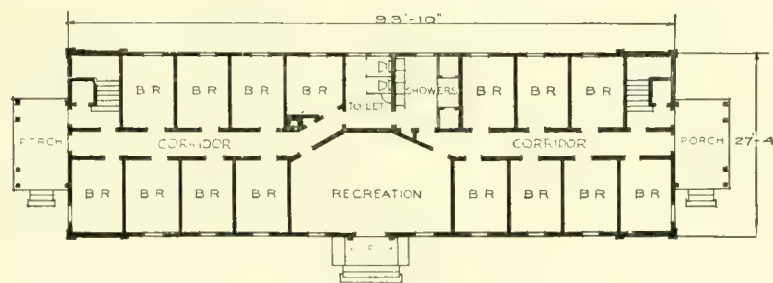
SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT INDIAN HEAD, MD.

ARCHITECTS DONN AND DEMING



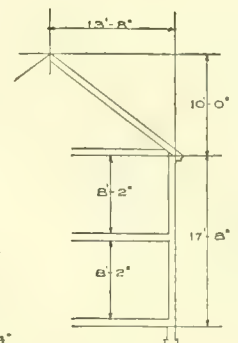
SECOND FLOOR PLAN



FIRST FLOOR PLAN

DORMITORY

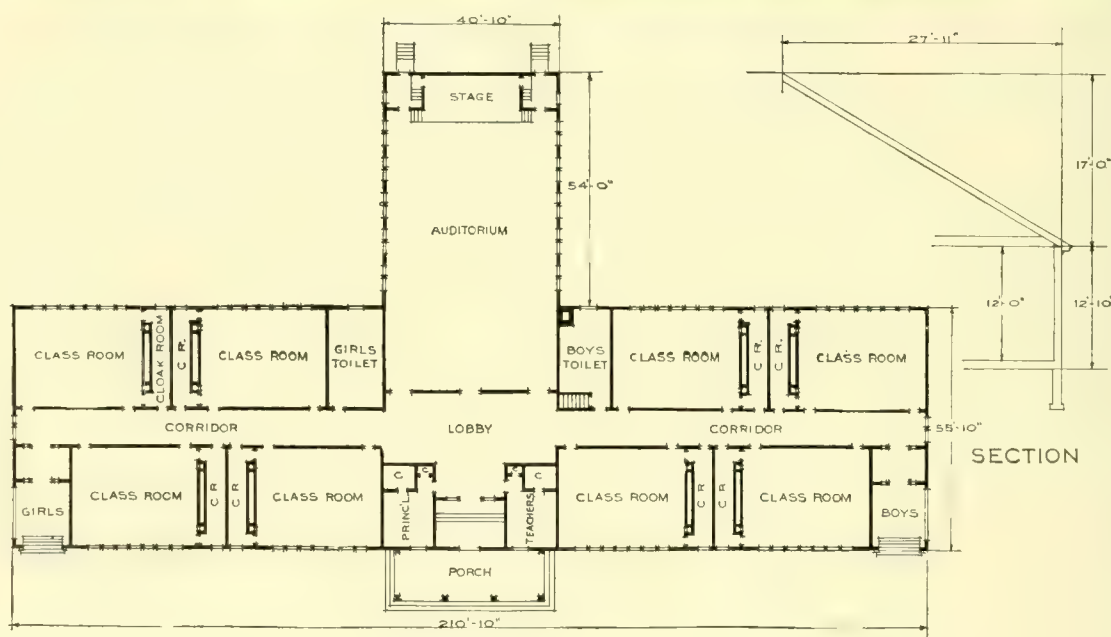
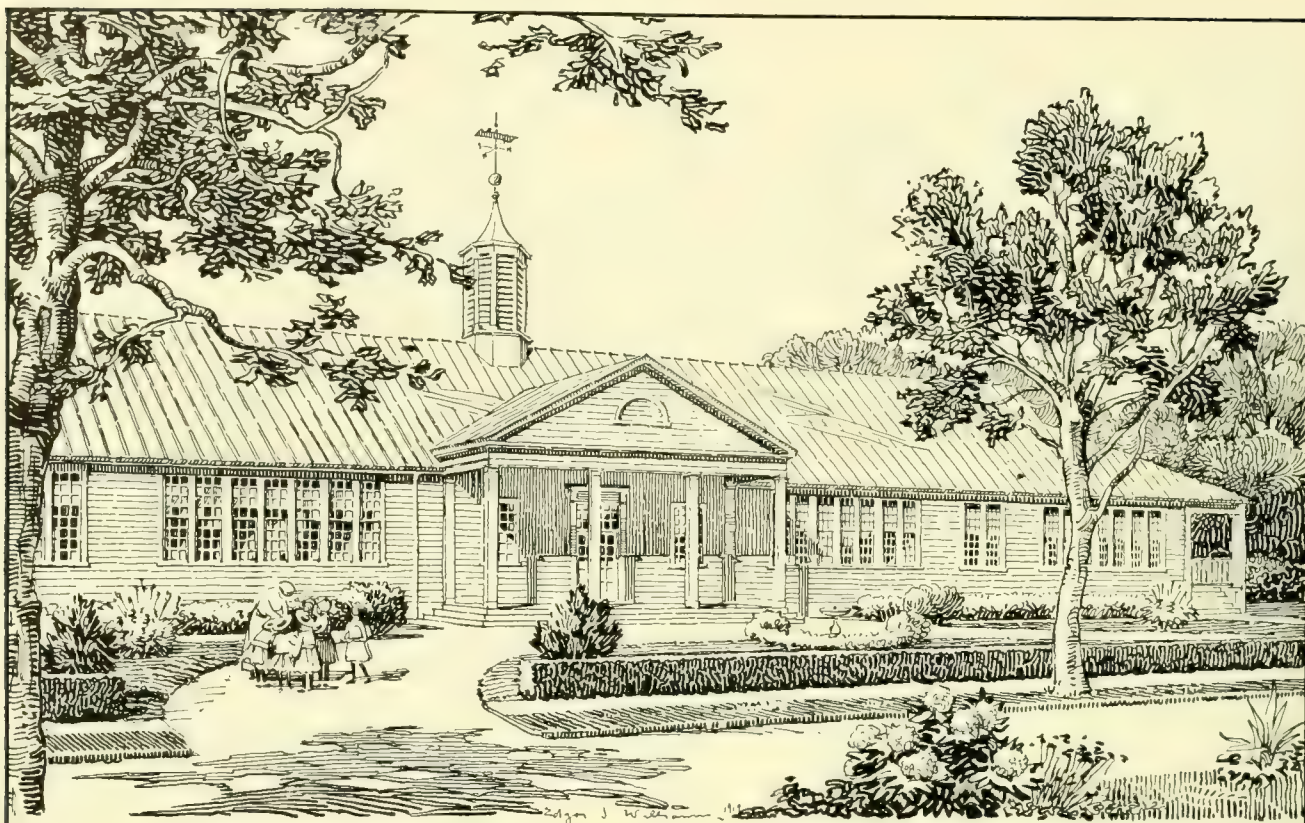
SCALE 10 20 30 40 50 FEET



SECTION

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT INDIAN HEAD MD

ARCHITECTS DONN AND DEMING



FLOOR PLAN
SCHOOL

SCALE 10 20 30 40 50 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT INDIAN HEAD MD

ARCHITECTS

DONN AND DEMING

DAHLGREN, VA. (INDIANHEAD): NAVAL PROVING GROUND LOWER STATION (PROJECT NO. 496-A).

Area planned: 166.50 acres. Housing planned: Detached houses, 38 families; semidetached houses, 40 families; apartment houses, 4 families. Total, 82 families. 460 persons in dormitories.

(For further information see tables, Chap. IX.)

The facilities for gun proving at the Indianhead Station have become so inadequate that the Navy Department is establishing a new proving ground about 20 miles farther down the river on the Virginia shore where Machodoc Creek enters the Potomac. Here the department owns several hundred acres of low-lying lands, the easterly portion of which is to be set aside for gun proving work; and when present plans are completed facilities as regards range, equipment, convenience, and effectiveness will be the best in the world. The work here will be administered from the Indianhead office and the proving of small guns and experimental work will still continue at Indianhead.

Upon the westerly part of the tract, about half a mile from the gun emplacements, the new village of Dahlgren is to be so located that danger from accident will be reduced to a minimum, all buildings being out of the way of the fragments of bursting guns or shells.

Plans and advice only were requested of the United States Housing Corporation, the Navy Department furnishing the funds and intending to carry out the project a little at a time as circumstances may require. The town is to be created *de novo*. The construction force in their temporary barracks comprise the present population.

The population to be housed, as the plans now stand, includes the following list, although it is expected that as the station develops and the gun proving at Indianhead is more completely discontinued the number of employees of the various grades will be materially increased at Dahlgren, and it was especially requested that our plans provide opportunity for considerable expansion: (a) Commandant of station; (b) 20 or more commissioned officers with families, part of whom would be junior commissioned officers, who would prefer semidetached houses, some without children preferring apartments; (c) 20 or more married warrant officers, some of whom would prefer semidetached houses and some without children preferring apartments; (d) 20 or more unmarried commissioned

officers; (e) 20 or more unmarried warrant officers; (f) 75 or more unmarried civilians, two-thirds of whom would be skilled workers; (g) 6 or 8 married officers of marines; (h) an uncertain number of civilian laborers; (i) 300 marines in barracks.

About 200 acres of the Government-owned land is available for housing and recreation. It is low-lying, with slight changes in elevation, the highest point being but 18 feet above tide level. There are four long narrow marshy areas extending into the property from the river. These are to be filled to a level of 3 or 4 feet above tide with material dredged for the new dock and its approach channel. Except for this, the required grading operations will be very slight. These low areas are fringed with trees and shrubs. There is very little good topsoil; the subsoil is clay and hardpan, with no ledge. On the whole, the land is well adapted to subdivision and building.

The Potomac River, which at this point is nearly 4 miles wide, borders the tract on the east; Machodoc Creek is the southern boundary, and the reservation extends north to include several hundred acres, with a right of way nearly a mile in length to the nearest highway. North and west are great areas of open Virginia farms. Fredericksburg, the nearest city of any size, is 25 miles west.

Access is at present entirely by water. The Navy Department has built a modern dock with facilities for handling car floats and freight, and cars are towed down the river from Washington or up from Norfolk. There is now a system of trackage on the property, with sidings half a mile or less from the projected development.

There are no utilities at present, and the differences in elevation are so slight that while surface-water drainage can readily be directed into bays, creek, or river, house sewerage will require two to three small separate disposal plants. Drinking water is obtained from an artesian well, and an electric-light plant has been installed in connection with the water-works plant.

At present all traffic originates at the dock and all streets are residential. When the road over the

right of way to the State highway north and west is completed, Sampson and Welsh Roads might be termed arterial streets. Streets are in general 50 feet wide between property lines, with an 18-foot roadway of oiled macadam, 12-foot planting strip (permitting pavement widening) with trees 40 to 50 feet apart, and 4-foot sidewalks with no hedge allowance. All land being Government-owned, hedges, if planted, could be inside the property line. While the differences in elevations are slight there has been a careful adaptation of road profile to existing topography.

Paved alleys 18 feet wide will serve the rear entrances of the post office, stores, Colonnade Row, and the hospital, with a branch to the community garage and stable.

The dock being the starting point of all traffic from the water, "Dock Square" is provided for convenient distribution and handling of freight and troops. To the east Sampson Road and the railroad tracks lead to the proving grounds. To the west Sampson Row and its inclosing streets give sites for the group of village stores and a "movie hall," and for the post office and the fire station, while between the "Row" and the water front in a 3-acre park is the headquarters building.

The ample area, the ability to secure good upkeep and policing, the need of some large open space for men marching and drilling, made it reasonable to design a number of large formal tree-framed spaces which offer good vistas. These are: Sampson Row west to Sampson Square with its bandstand; Village Green south to the water tower in Dock Square, the tower to be well designed and to serve as a look-out; and Marines Parade, enframed by four rows of trees with the large brick barracks for marines at the north and broad stretches of the Potomac River at the south.

All of one of the minor headlands, about 4 acres, is reserved for the commandant's home.

Next north a larger level area, "Caffee Crescent," offers a neighborhood of homes for married commissioned officers. Further north beyond "Cove Park," Holden Road and Holden Circle serve another neighborhood, the married warrant officers. Near the marine barracks are the sites for homes of officers in charge of marines.

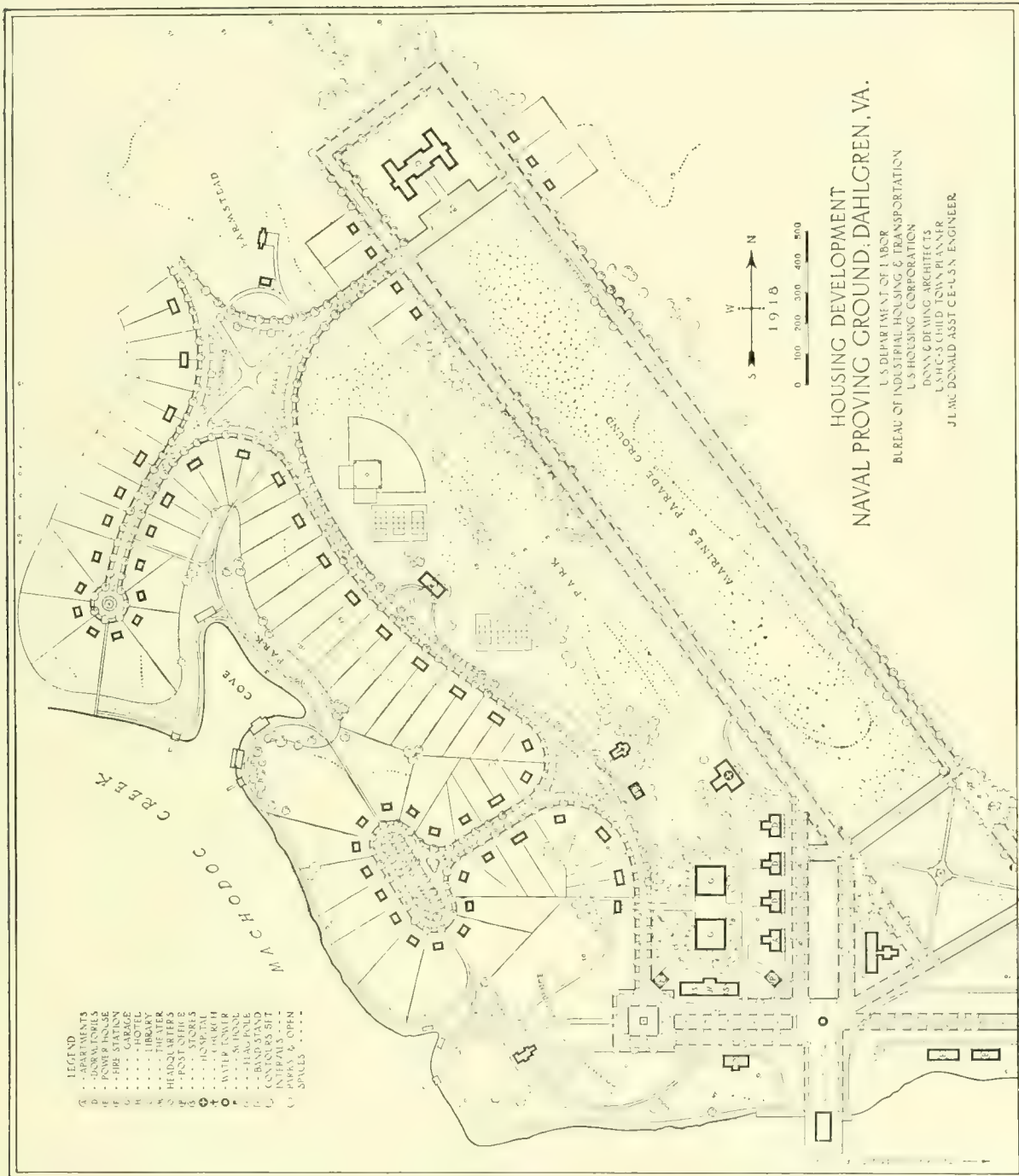
Since all the land is under Government ownership there is not the usual distinction of public parks from private property, but obviously ample area for outdoor rest and recreation is provided which will be held safe from any further congestion or use for incongruous purposes.

House walks will be determined later when architectural plans are developed. Every home is given land enough for flower and vegetable gardens to be developed by the residents.

Platting of lots will be informal. Detached houses are given lots with frontages of from 75 to 100 feet, and depth varying from 150 to 250 feet. Semidetached houses are on lots with frontages averaging 75 feet and depths of from 150 to 250 feet. In general, houses are from 30 to 35 feet from street lines. There is considerable variety in the orientation of houses, partly for the purpose of giving each home a water view. Besides the various buildings already mentioned sites were set aside as requested for a small hotel and a hospital.

The apartment house and the bachelors' quarters are proposed to be of harmonious if not uniform architecture. Colonial in style, each with a colonnaded porch, whence the name Colonnade Row.

Northwest of the marines' barracks much of the large area of open land is to be developed for a community farm with a house for the farm superintendent facing Crossways Park. Directly north of the marines' barracks several acres of the nearly level land could be used for football, polo, aviation, or camp grounds on occasion.



KENILWORTH, N. J. (PROJECT NO. 607).

SITE C.—Area planned: 0.67 acre. Housing planned: Dormitories, 78 persons.

SITE D.—Area planned: 0.29 acre. Housing planned: Dormitories, 26 persons.

SITE E.—Area planned: 5.25 acres. Housing planned: Semidetached houses, 52 families.

(Project discontinued. For further information see tables, Chap. IX.)

The village of Kenilworth, which had about 1,500 inhabitants before the war, is situated some 6 miles westerly of the city of Elizabeth. The plant of the American Can Co., in Kenilworth was principally engaged in shell loading and had 1,600 employees in July, 1918, a large number of them being girls living in the nearby towns, and some foreign labor, single men mostly, for whom no reasonable accommodations were to be had in this small village. The Housing Corporation planned to build 52 semi-detached houses for the families of the better class of skilled labor and for foremen, and in addition boarding houses for foremen and clerks, for common labor, and for negro labor.

The village has trolley connections with the city of Elizabeth and is an attractive semirural district which would have made residences at this point not undesirable.

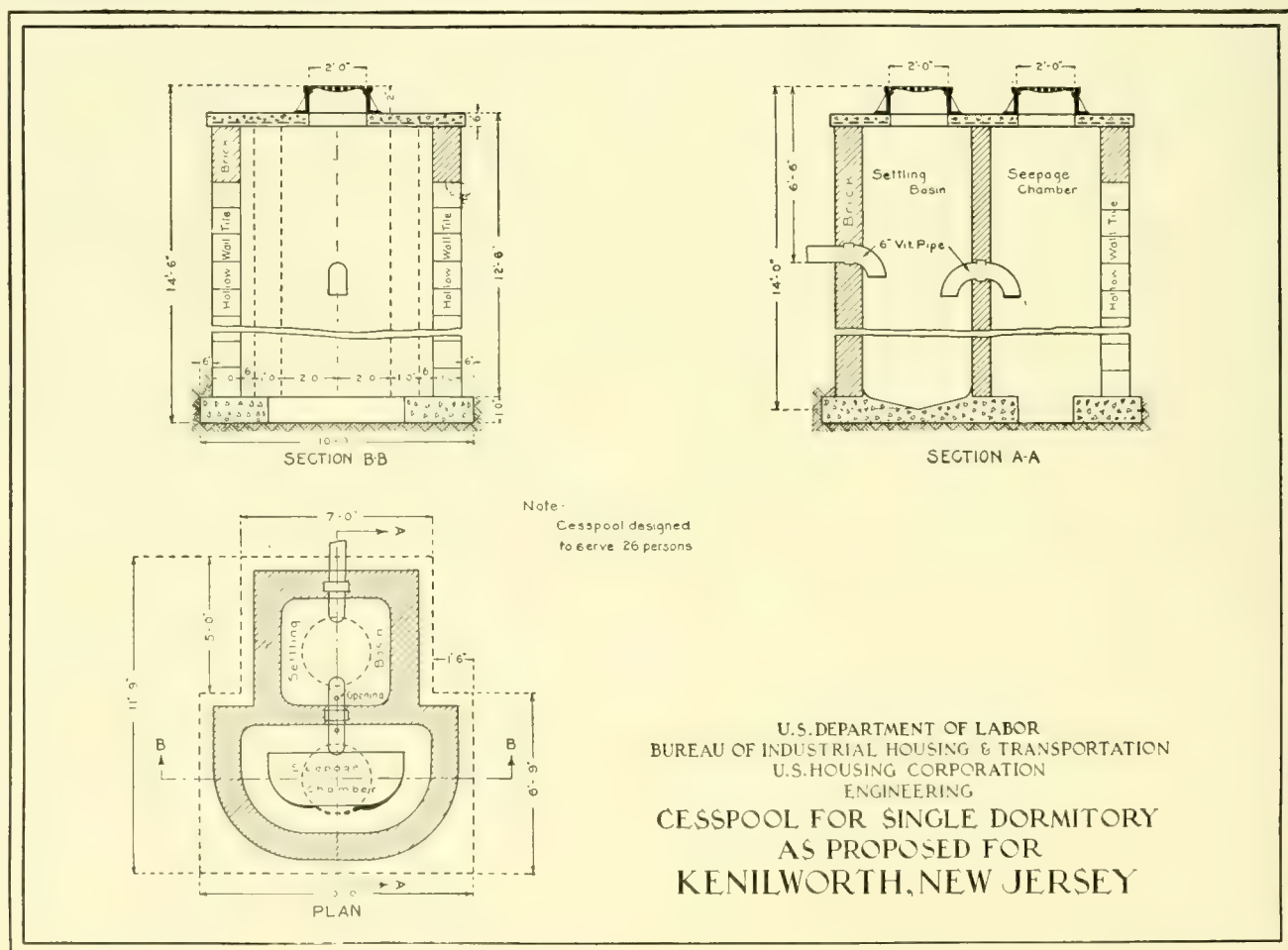
This development, being located in a small village, has no general utilities with the exception of water supply. The utilities, therefore, are of as simple a character as possible. No pavements are to be constructed. The village is served by a private water

company, which readily agreed to extend the small amount of mains required. These will be 6 inches in diameter. The water is filtered, and the pressure is high, so that the fire protection will be of the best.

As there is no general sewer system and the soil is of a sandy character, cesspools were designed for each house and for each boarding house. The village of Kenilworth is part of a sanitary district which is still in its preliminary stage, and when this is completed Kenilworth will have adequate sewers to which this development would have been connected, thus obviating the necessity of cesspools.

From the sites as chosen it was about a mile to the railroad station, one-half a mile to the churches, 2 miles to the high school, a short walking distance to the factory and to a grade school, and a 5-cent fare by street car to Elizabeth.

No particular distinction was obtainable by grouping the houses, but there was something gained in appearance by giving a greater setback to the central houses of the blocks. Each yard was to be planted with shrubbery with a fruit tree and surrounding hedge, and vines upon the house.



LOWELL, MASS. (PROJECT NO. 398).

BOSTON & MAINE RAILROAD SITE.—Area planned: 3.57 acres. Housing planned: 170 single men in dormitories.

HIGH SCHOOL SITE.—Area planned: 2.23 acres. Housing planned: 202 single women in dormitories.

HIGH SCHOOL EXTENSION SITE.—Area planned: 9.18 acres. Housing planned: detached houses, 19 families; semidetached houses, 60 families; apartments, 4 families; total, 83 families.

LIVINGSTON SITE.—Area planned: 6.01 acres. Housing planned: detached houses, 16 families; semidetached houses, 24 families; total, 40 families.

(Project discontinued. For further information see tables, Chap. IX.)

Lowell, Mass., one of New England's oldest industrial communities, had among its many manufacturing plants several that were engaged in producing munitions or their accessories. These war industries had absorbed a large number of employees from local nonessential industries and had brought in many additional workers, of whom a large percentage were unmarried women. The sudden increase of War Department orders to these concerns with the ensuing labor increase entailed a serious housing problem, for the city's other varied interests were already experiencing housing difficulties. Investigation showed that the city was not badly underbuilt and could readily furnish lodging for a considerable percentage of the unmarried workers. There are many large cotton mills here and a large foreign population, which includes Greeks and Armenians in great numbers. The grades of workers to be served by the United States Housing Corporation projects included skilled and semiskilled mechanics. The problem resolved itself into building a comparatively small number of houses with a few stores, building dormitories with cafeterias for unmarried workers, and providing additional cafeteria service for workers lodged in private houses.

The problem of sites was complicated by the fact that the industries concerned were located in two or three districts; no one of them was far from the center of the city, but the built-up area made it difficult to find sufficient land near them.

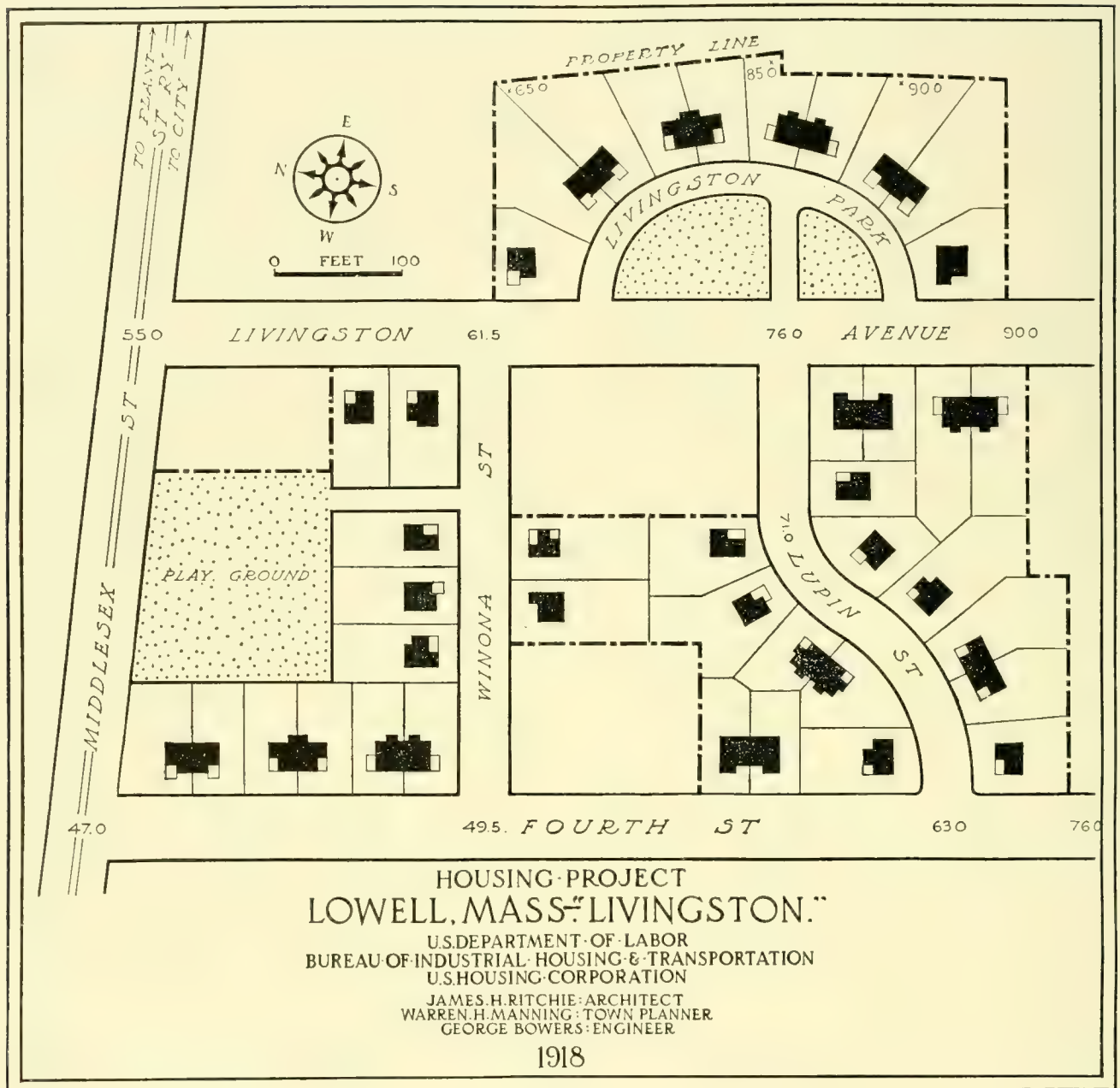
The dormitories were planned for two sites, one of three buildings for men and one of four for women, each site with a cafeteria. The women's group was provided with a clubhouse with café service. Houses were planned of four, five, and six rooms, single and semidetached types, situated on two widely separated tracts. The largest tract chosen, "High Street extension," is directly east of and less than half a mile from the principal industrial district. Here a platted and accepted street layout was followed with little change.

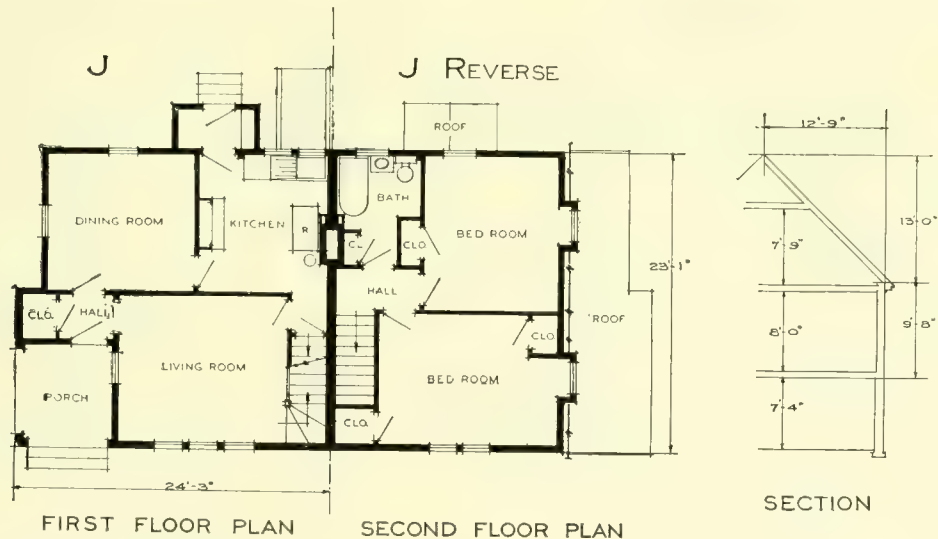
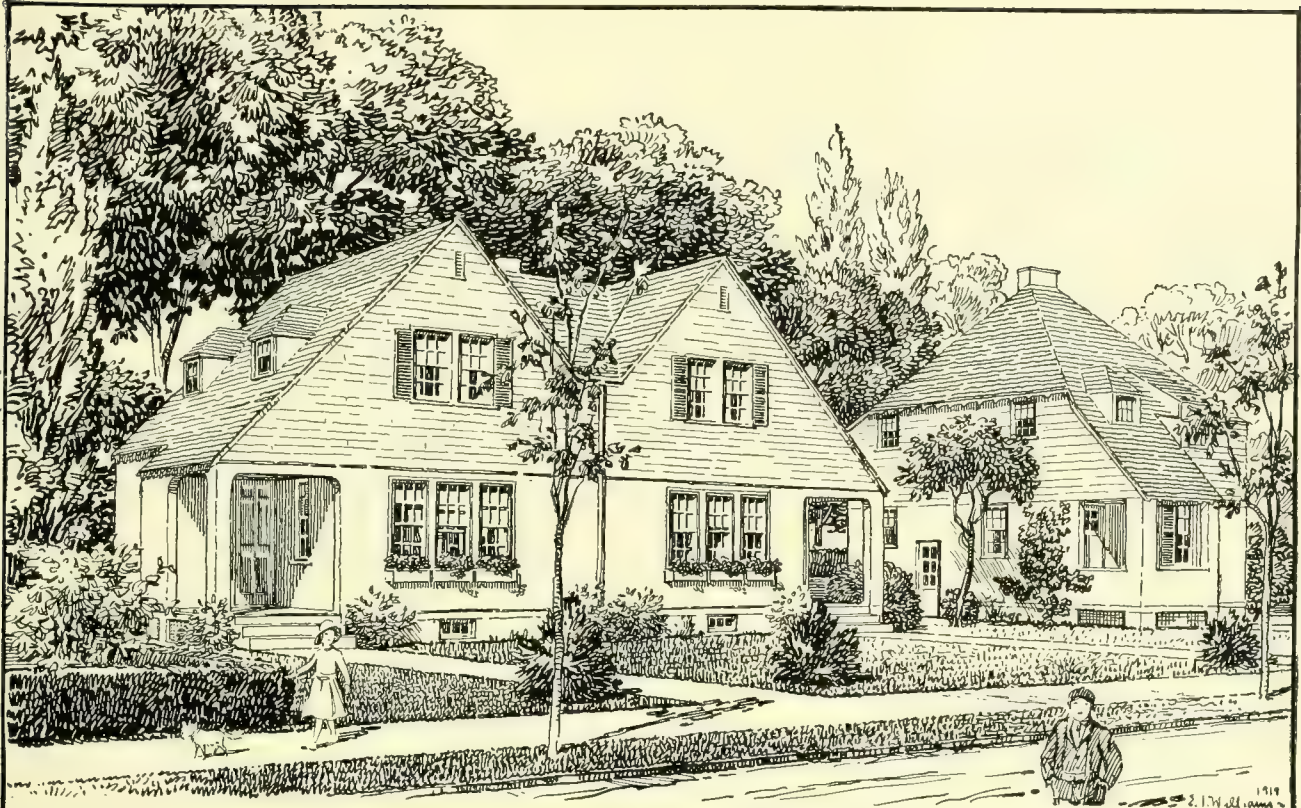
The Livingston tract is a little over a mile west of the industries concerned. Part of this tract slopes steeply, with a short unopened street, Lupin Street, planned diagonally across the slope. As thus located, this street would have involved heavy grading and very steep gradient. Furthermore, it came at such a point that the lots facing it would have been unduly deep. It was therefore diverted to follow more along the slope, thus reducing the gradient and producing better shaped lots.

At the east end of this street, across the already paved Livingston Street, was another piece also deeper than necessary. In its center along Livingston Street were some very fine oak trees. The plan, therefore, provided a secondary roadway embracing these trees in a small park and providing access to a larger number of building sites of reasonable depth than could have been arranged along the straight frontage of Livingston Street.

On the north along the main thoroughfare, Middlesex Street, a group of extra deep lots were dedicated for a local playground, much needed in this section. It will be seen, therefore, that although the tract provided for but 40 houses a maximum of interest was secured.

The northern boundary of the tract is Middlesex Street, a main thoroughfare leading to town. Livingston Street, already paved, crosses the tract from north to south and is quite steep, for a portion of its length 10 per cent. The tract is nearly a mile from the store center, but schools are within half a mile. The topsoil is good loam nearly a foot in depth with gravelly subsoil. The character of construction required was permanent wooden detached and semidetached houses. The surrounding development is residential of medium class, with some even better. For developments of the size of the High Street and Livingston sites, the types are too numerous and varied in treatment, and the roofs too complicated for pleasing grouping. These faults are intensified by the size of lots, which were rather smaller than in other developments of similar character. Plans, however, are generally very good.



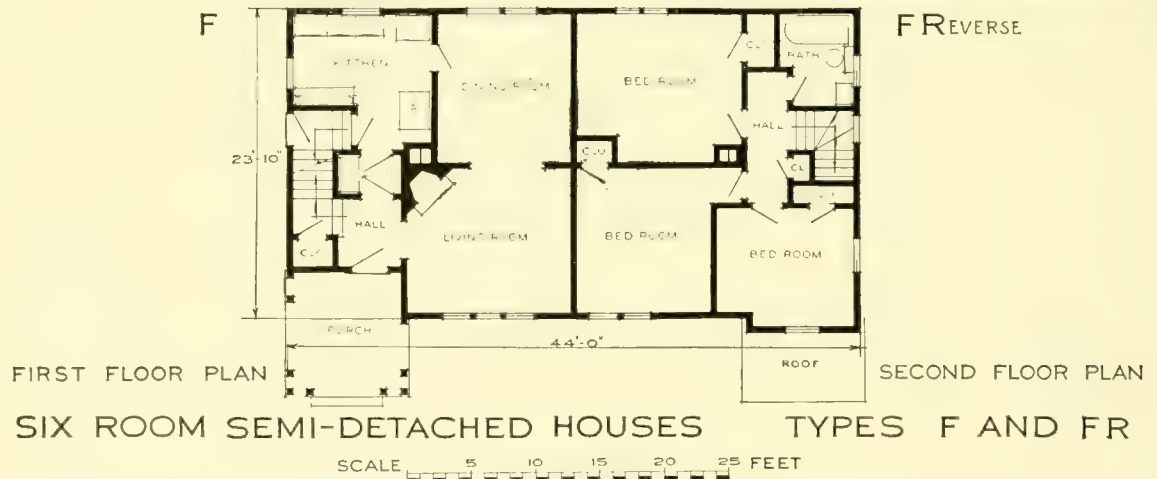
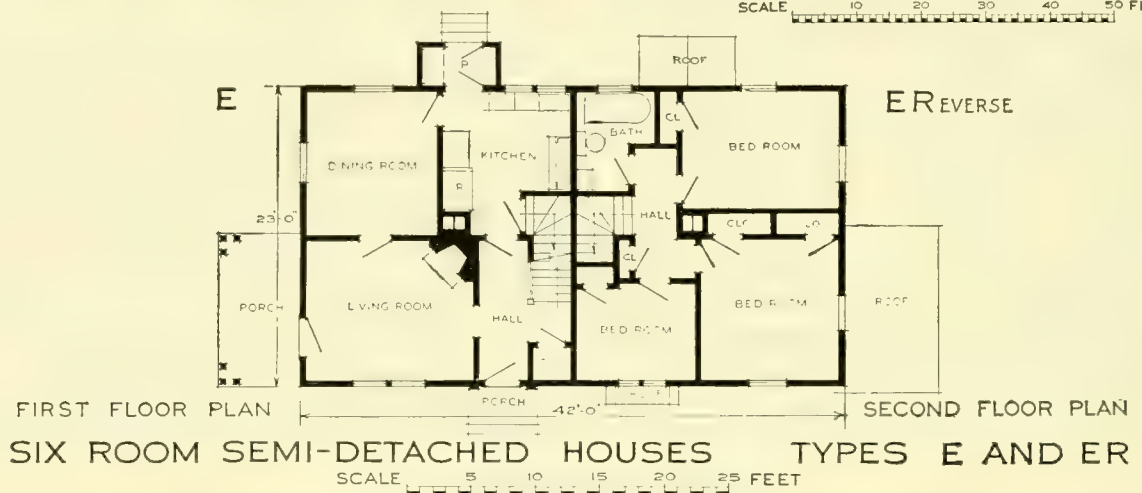


SEMI-DETACHED FIVE ROOM HOUSES TYPES J AND J R

SCALE 5 10 15 20 25 FEET

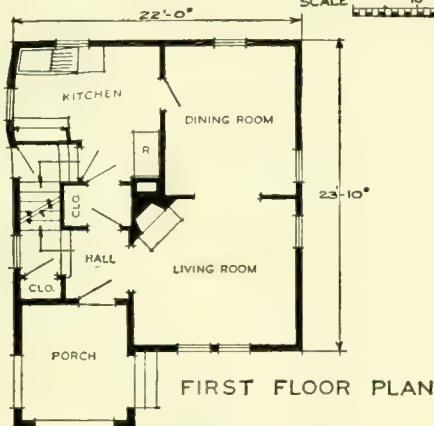
UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT LOWELL MASS

ARCHITECT JAMES H RITCHIE

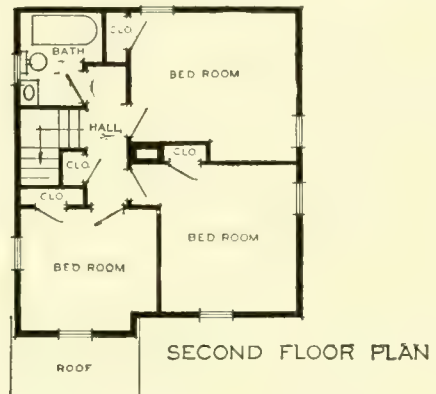


UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT LOWELL MASS

ARCHITECT JAMES H. RITCHIE



FIRST FLOOR PLAN

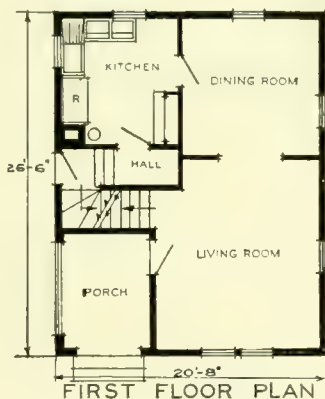
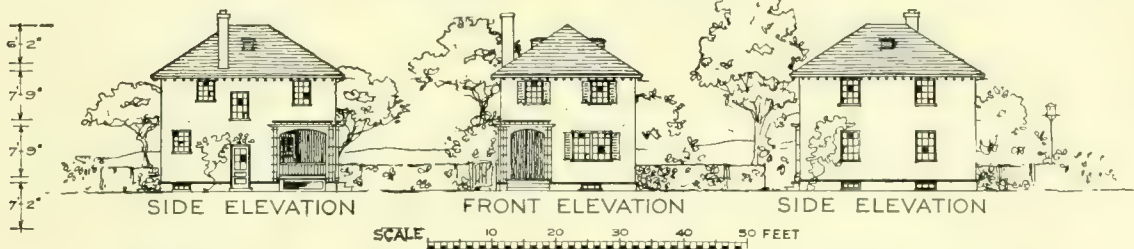


SECOND FLOOR PLAN

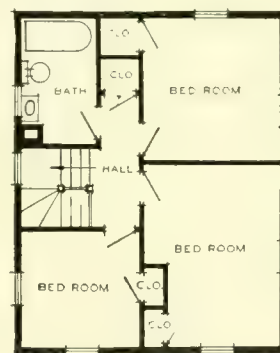
SIX ROOM HOUSE

TYPE Q

SCALE 0 5 10 15 20 25 FEET



FIRST FLOOR PLAN



SECOND FLOOR PLAN

SIX ROOM HOUSE TYPE B

SCALE 0 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT LOWELL MASS

ARCHITECT JAMES H. RITCHIE

LYLES, TENN. (PROJECT NO. 2972).

Area planned: 53.66 acres. Housing planned: Detached houses, 110 families; boarding house, 40 persons.
Colored Development.—Area planned: 7.42 acres. Housing planned: Detached houses, 15 families.

(Project discontinued. For further information see tables, Chap. IX.)

A mile south of Lyles, 50 miles southwest of Nashville, Tenn., the Bon Air Coal & Iron Corporation were increasing their wood distillation plant and manufacturing calcium acetate and wood alcohol used in the fireproofing of airplanes, with charcoal as a by-product. The Bon Air Corporation had already put up a 20-room hotel and four small houses. To house the needed employees necessitated the creation of a complete new village in the heart of the Tennessee Mountains, since no group of habitations was in the vicinity except Lyles, which is only a small village. A branch of the Nashville, Chattanooga & St. Louis Railroad runs through Lyles, and a spur leads to the plant.

The plant is in a narrow valley through which runs a stream. The best available housing site lies on the uneven ground above the steep slope of the valley, and close over the plant. School, store, and fire protection had to be supplied.

The workers are mostly laborers, both white and colored, but some skilled help and superintendents were also to be housed. Their living requirements are simple. The land, owned by the plant, but to be turned over to the Housing Corporation, was very cheap, and therefore the chief restrictions on the size of the lots and the type of layout were the topographical difficulties, the cost of utilities, and the limited amount of available land near the plant. The soil is a heavy clay, full of limestone pebbles, and nearly impervious to water. The colored workers were to be housed in a little group of 15 houses across the valley. The development here described was for the white population only.

Two streets already existed on the site: Maple Street (running north and south nearest the easterly edge of the property), which is the county road, leading to Allen's Creek and to Lyles, and Warren Street running westerly from Maple Street steeply down hill to the plant. The county road formerly ran through the valley, but was diverted here so

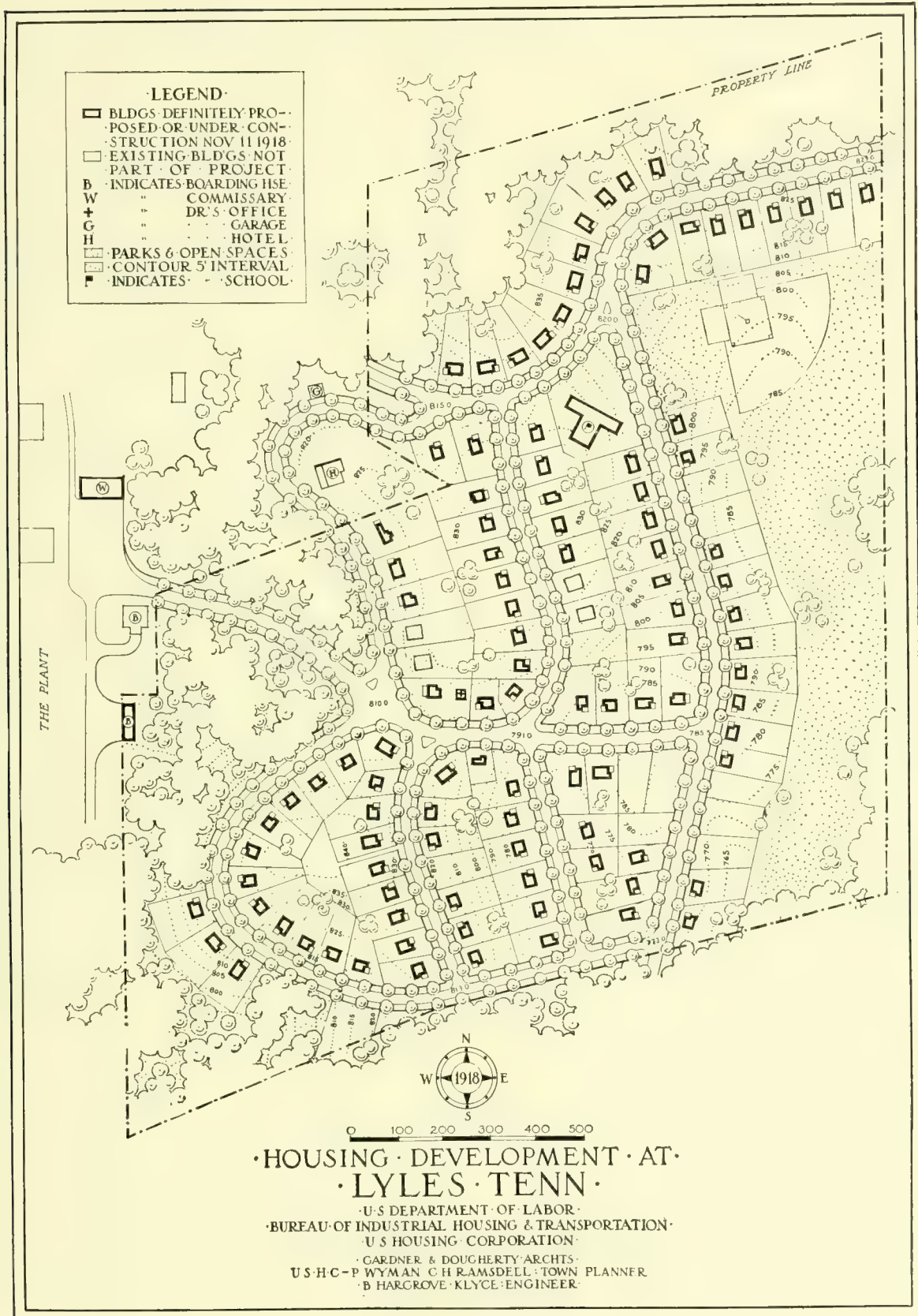
as not to interfere with the plant. The road gradient is in places as steep as 12 per cent, but this is not unusual in the country thereabout. In order to arrive at a consistent and economical scheme the area was studied on the ground and the tentative road layout worked out on a sketch topographic map of the site. These road center lines were staked on the ground, the location of houses roughly staked, and the scheme adjusted on the ground so that the best gradients of the roads, the saving of grading, the balance of necessary cut and fill, the accessibility of the houses, the convenience of each house site, and the reasonable shape and size of the lots were all considered, as far as the good of the whole scheme made it practicable.

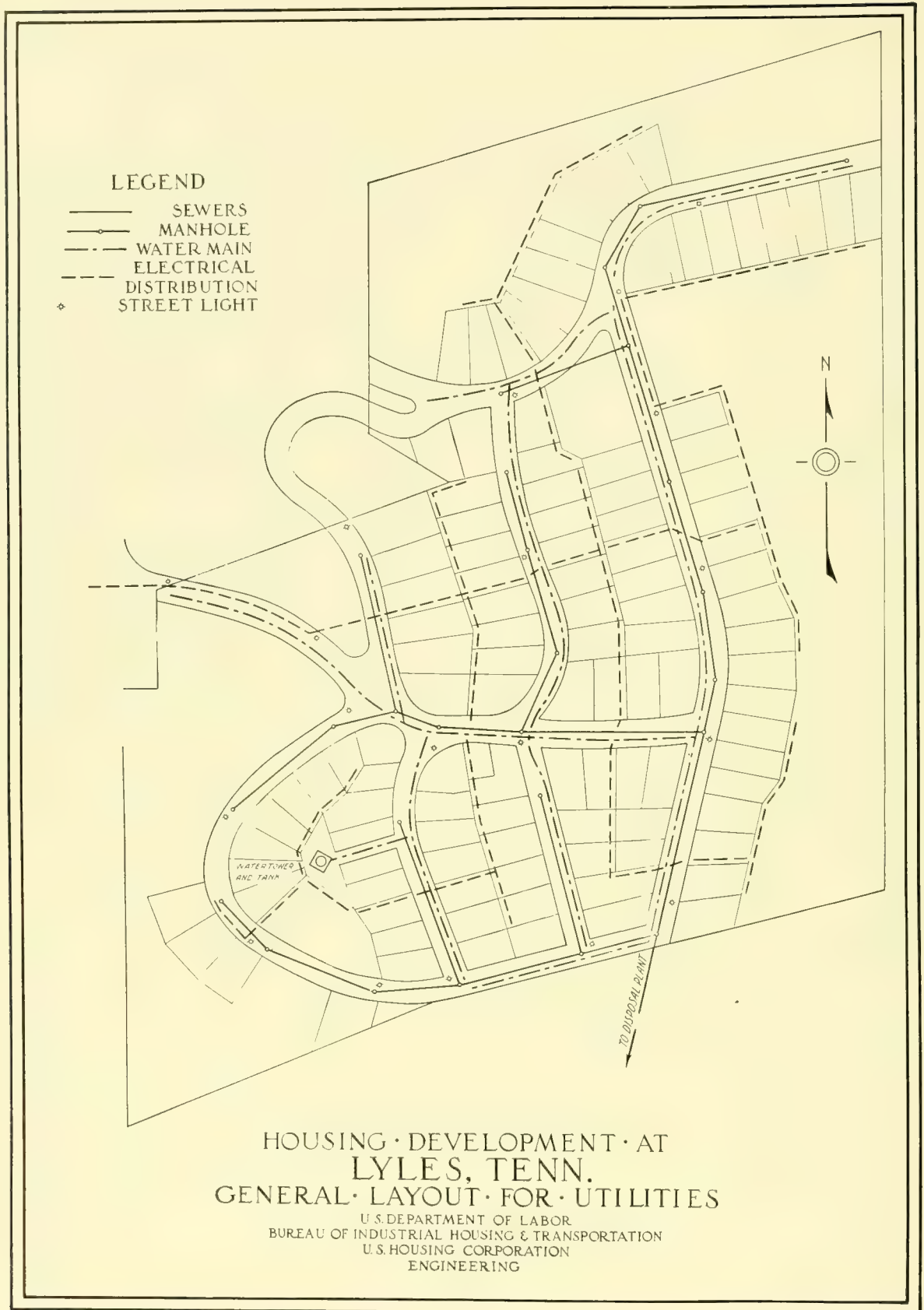
Were the village to be enlarged from what the plan shows, additional streets could be run off from Maple Street to the northeast, connecting with the land along the eastern boundary of the present property, which is separated from the present development by a deep valley, except for the narrow ridge upon which Maple Street lies.

There is a store and commissary and boarding house where the main road leaves the plant. The hotel and the better houses of the proposed development overlook the valley. There was to be a combined school, church, and community building at the northeast corner of the project, but if the village were enlarged this building would be near the center. All this affects somewhat the location of the road system. The roads were to be of gravel, the sidewalks concrete.

The houses follow the direction of the streets with such setbacks as the topography permits. There is some heavy grading, but both streets and houses generally fit the ground. Every yard is fenced, as it is the Tennessee law that stock may overrun such property as is not fenced. The yards and streets are planted with trees, shrubbery, and vines, and each yard has its vegetable garden though sometimes on land of considerable slope.







MARE ISLAND NAVY YARD (VALLEJO), CALIF. (PROJECT NO. 581).

SITE FOR HOUSES.—Area planned: 55.52 acres. Housing planned: Detached houses, 231 families; semidetached houses, 36 families; semidetached two-flat houses, 152 families. Total, 419 families. Housing constructed: Detached houses, 83 families; semidetached houses, 24 families; semidetached two-flat houses, 120 families. Total, 227 families.

SITE FOR DORMITORIES.—Area planned: 7.32 acres. Housing planned and constructed: Dormitories and cafeteria accommodating 400 men.

(For further information see tables, Chap. IX.)

The Mare Island Navy Yard is situated at the extreme northerly end of San Francisco Bay and separated by Mare Island Strait from the mainland and the town of Vallejo. The greatly augmented force at the navy yard that the advent of the war made necessary could find accommodation neither on Mare Island nor in the adjacent town of Vallejo. The conditions became so bad that even the more responsible men frequently requested their discharge because unable to obtain proper accommodations within their means.

The workers needing housing included (a) chief petty officers and petty officers whom it was proposed to care for within the navy yard itself by a special appropriation of the Navy Department; and (b) civilian employees who were to be housed across the Mare Island Strait near Vallejo. Housing these civilians was the task of the Housing Corporation.

Transportation of labor from the neighborhood of San Francisco would take too long to be practicable. Buying scattered lots in Vallejo would be too slow and too expensive, particularly as the utilities of the town, especially the water supply, were already largely outgrown. The nearest available site not held at lot prices was on the rather steeply sloping hillsides north of Vallejo facing southwest across Mare Island Strait, near the end of a proposed causeway connecting with the navy yard.

Two tracts were secured, one of about 7.32 acres for dormitories and the other of about 110 acres for houses, the former on the outskirts of the town of Vallejo, the latter less than half a mile farther north. Of the 110 acres only 55.52 were developed, though all were planned. The dormitory site has a rise from south to north of 45 feet. The site for houses is a steep hillside slope with a beautiful outlook toward the mountains of Marin County. The site now being developed lies on the hillside facing Mare Island Strait, and rising to two rolling rounded summits with a dip between them. The rest of the site slopes in the opposite direction, though more gently, and offers no especial local difficulties to development. The whole site is open pasture land with neither houses nor trees.

Surrounding the development is open ranch land, although toward Vallejo a rectangular layout for streets and lots has been projected and placed on the maps, and land set aside on one of the hill-tops for a cemetery, while northwest of the property is an abandoned brickyard.

The stores and schools of Vallejo are nearly 2 miles from the project, and in any case are inadequate. Approach to the site is by Wilson Avenue, along the shore, which leads to Vallejo and to the future causeway which is planned to connect the navy yard and the town. For the present there has been built a pier in front of the development, whence a ferry runs to Mare Island. This pier was built as an unloading pier so that most of our materials might come by water, making a substantial difference in the cost of the work. Estimates showed that the probable saving in handling the work would about equal the cost of the construction of the pier, while at the end of the job we should still have the pier for dock purposes.

Provision is made in the plan for sites for two schools, a community hall and small group of stores, but none of these have been built. One school and the community hall were to occupy a portion of the triangle where Daniels Avenue leaves Wilson Avenue, and this area is sufficiently large to permit a small recreation ground north of the school building. There is also opportunity for other community groups, including churches, movie halls, and stores. The main lines of the street system consist of the approach street, Wilson Avenue, along the water front, and the main arterial street, Daniels Avenue, leaving Wilson Avenue at a narrow angle to minimize gradient, and running between the two rounded hill summits to the northern boundary of the property. There are also two other lines leading back from the shore, Sims Avenue, running on easy curves over and around the hill where the slopes are less steep, and a series of streets near the southern boundary of the property, climbing the steep hill in a series of zig-zags to obtain possible gradients, and even then being in places as steep as 12 per cent. The rest

of the streets run for the most part parallel to the hillsides.

No alleys, as such, were employed, but several of the longer blocks are crossed by public paths laid out 15 feet in width with walks 5 feet wide and steps at the steeper slopes.

There are also a number of instances where advantage is taken of the steep slopes and the considerable area between parallel streets to provide sites for groups of neighborhood garages, the buildings to be cut into the hillside. These have courts and approach drives to the near-by streets.

There is an interesting vista looking northwest on Wilson Avenue to be terminated by the Community Hall in the triangle where Daniels Avenue branches, but most important is the inspiring view west and south across the narrow Strait, low-lying Mare Island, and the upper waters of San Francisco Bay to the mountains of Marin County and the summit of Mount Tamalpais only about 20 miles to the southwest.

The trend of most of the residential streets is east of south and west of north and, as they are arranged in tiers along the hillsides, houses facing them not only get morning and afternoon sun but either the front or the rear rooms and porches command an excellent view.

Because of the somewhat isolated location of the project and the fact that it was just beyond the present limits of the plants of the various utility companies, and outside of the city limits of Vallejo, it was necessary to consider the project as an independent town-site development for which original provision for all utilities had to be made. These were planned in conjunction with the general layout as a comprehensive whole, and they are here more fully described than for any other project.

The first problem to be considered was that of the general character of the utilities in their relation to permanence of construction. The project being one which was regarded as an adjunct of the Mare Island Navy Yard its permanency was assured, and the type of construction adopted was of a more durable character than that which might otherwise have obtained. At the same time it was necessary to keep in view the fact that costs would have to be held within limits determined by the value of the project as an investment. The side hill location of the streets necessitated heavy grading and the street paving demanded was of a type that would withstand moderately heavy traffic on fairly

steep gradients, with adequate provision for heavy surface storm drainage.

As in all of the projects, the location of all houses being definitely known it was possible to plan and construct simultaneously the utilities and house services for water, gas, and electricity, so that when the street paving is completed and the project cleaned up there will be no immediate necessity for experiencing the later tearing up process for the installation of additional utilities, which is so common in most municipalities.

The width of streets between curbs ranges from 20 to 30 feet, with 24 feet as the standard width for all average streets. The type of paving selected is that of a 5-inch concrete base finished with a half-inch surface of screenings and asphaltic oil thoroughly rolled. Street curbs throughout are of concrete with standard cross section and finish. The sidewalks vary in width from $3\frac{1}{2}$ to 5 feet and are of standard cement construction. Owing to the great range in elevation of the houses on the upper and lower sides of most of the streets the sidewalks are elevated above the street curbs or depressed in some cases below them to conform to the lot elevations in front of the houses. This elevation of the walks in some places is as much as 10 feet. The curb line is connected with the sidewalks by flights of cement steps. Construction of all house entrance walks and steps and tradesmen's walks will be carried out simultaneously with the construction of the street sidewalks.

This project being an adjunct of the Mare Island navy yard the water supply is obtained through and delivered by the navy yard. At the present time the navy yard is obtaining its water supply from a series of wells and pumping plants some miles distant near Cordelia. This water is pumped into the mains to the supply main which crosses Mare Island Strait from Vallejo to the navy yard. This navy yard supply main has been tapped on the Vallejo side of the Strait and water is delivered to the project from this source. At the point of delivery a normal water pressure of 70 pounds per square inch is available, but this is not sufficient to afford complete fire protection. The elevation of the houses in the project ranges from 20 feet to 120 feet above sea. The volume of water assigned to the project for domestic consumption is 100 gallons per capita per day for all families, and 40 gallons per capita for the occupants of the dormitories. The entire tract is piped with class "C" cast-iron

pipe of sufficient size to guarantee ample fire service and to provide for future extensions of the project. Fire protection is assured by the construction of a 500,000 gallon storage reservoir on the highest point of the property at an elevation of 210 feet. Water will be delivered to this storage reservoir from the supply mains by means of a duplicate pumping plant, each pumping unit of which will have a delivery capacity of 600 gallons per minute under a maximum head of 250 feet. These pumps are controlled both by hand and by very interesting automatic electric control apparatus. Standard two-way fire hydrants are installed throughout in such a manner as to enable four 250-gallon fire streams to be delivered at any one point at the same time with a minimum length of hose. A motor hose-reel wagon equipped with chemical fire-fighting apparatus is also provided. Service pipes are installed from the mains in the streets to each house. These services are of standard construction, with goose-neck connections, and are equipped at the curb line with water meters. All water entering the project is metered after leaving the supply main through a Venturi meter equipped with a recording apparatus. Individual meters measure all water from the distributing mains to the consumers.

The entire tract is sewered in conformance with the most modern practice. All house services are connected with the mains as they are constructed. The dormitory and house sections of the project each have separate outfall sewers extending into the tidal water of Mare Island Strait. The main outfall sewers are built sufficiently large to provide for any future extensions of the project which might be served by them.

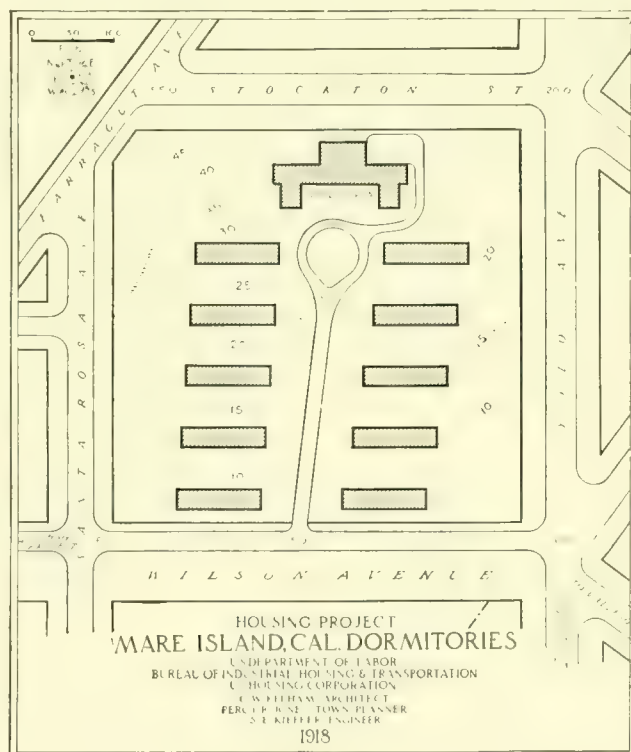
A complete system of 4-inch and 6-inch gas mains has been installed throughout the project for the distribution of low pressure gas for heating and lighting. All gas services have been carried to the houses as in the case of the other utilities. Individual gas meters are installed in each house. For the most part of the water and gas pipes have been carried in the same trenches.

The system of street lighting adopted is that of single globe electroliers placed along the curbs at intervals determined partly by the curvature of the streets. The maximum spacing of standards is 250 feet with an average spacing of about 190 feet. Each standard is equipped with two 400-watt lamps. The wiring for the street lighting system

is carried throughout in underground conduits laid in the sidewalk area between the curb and the walk. All electricity for house lighting and such uses is carried by means of aerial circuits upon pole lines placed at the rear lot lines between the houses, with aerial drops from the poles to the houses. All street crossings of the house lighting system are made by carrying cable through underground conduits from the nearest adjoining poles. The average length of these underground crossings is about 250 feet. At no point is there an overhead wire crossing on any of the streets. Electric current is furnished from the central switch-board of the Mare Island Navy Yard to the transformer station of the project, which is located at the pumping station. All lighting circuits for the dormitory section, both for street and house lighting, are carried in underground conduits. For this section there are no pole lines or aerial circuits of any kind. With the exception of Bath, Me., this is the only project of the Housing Corporation in which underground wiring was laid.

Telephone service will be provided throughout the project. The aerial cables will be carried upon the poles at the rear of the lots with aerial drops to the houses. All telephones will be carried across the streets in underground conduits.

A very interesting planting scheme is being executed, which includes a considerable variety of street



trees, many of them evergreens, not spaced regularly, however, but arranged quite informally in connection with groups of shrubbery and such hardy ground cover as *Mesembrianthemum*. Care is taken to employ only such plants as when once established will care for themselves with but a minimum amount of maintenance and no irrigation, and will best withstand the strong winds, which are continuous throughout the summer months.

Lots for detached houses have normally a frontage of 40 feet and depth of 100 feet, some hillside lots being 150 feet deep. For semidetached houses a frontage of 35 to 40 feet is allowed. The four-family apartment buildings are on lots averaging 80 by 110 feet.

All the slope, varying from 50 to 100 feet in width, between Wilson Avenue and the water is reserved for park purposes. There is a parked area where Daniels Avenue leaves Wilson Avenue, part of which is to be utilized for a school and community hall. Very interesting advantage is taken of the topography in planning for Benson Avenue, two sharp curves being necessary that leave two corner lots too steep for buildings but adapted to neighborhood parks of about half an acre each. A generous playground—4 acres—is set aside for the proposed upper school. All of these open spaces are to be treated informally as to paths and planting. Through cooperation with the Navy Department, which is compelled to dredge the straits to permit the passage of navy yard vessels, it is hoped to fill in the flats immediately in front of the Housing Corporation's property, and this filled ground would eventually be turned into a park or water front playground.

In the color scheme of the houses the endeavor is made to hold one unifying tone, by allowing all the roofs to weather naturally, and by painting all the trim white and having all the chimneys an even

gray. All the blinds are to be a light green; but the walls of the houses are to be of various colors, pink, gray, green, and brown.

The project in its entirety is, because of its situation and topography, one of the most picturesque of the Corporation's developments. The successful result is due to the correct conception of the kinds of houses suitable for the site and to skillful adjustment of the streets and house locations to the steep and rolling hillside.

It has been found that the attempt to group houses built on steep grades by any of the devices obvious merely in plan is not apt to accomplish the desired result, the different levels and the lines of roof often defeating the ends sought. At Vallejo whatever grouping has been done appears to be accidental and not the result of a study of balance in design. Varying though they do in design, there is still not so great a diversity as to cause an appearance of unrest.

The houses are so designed and placed that they look well individually and collectively whether viewed from front or rear, and the rears are distinctly visible from many points of view.

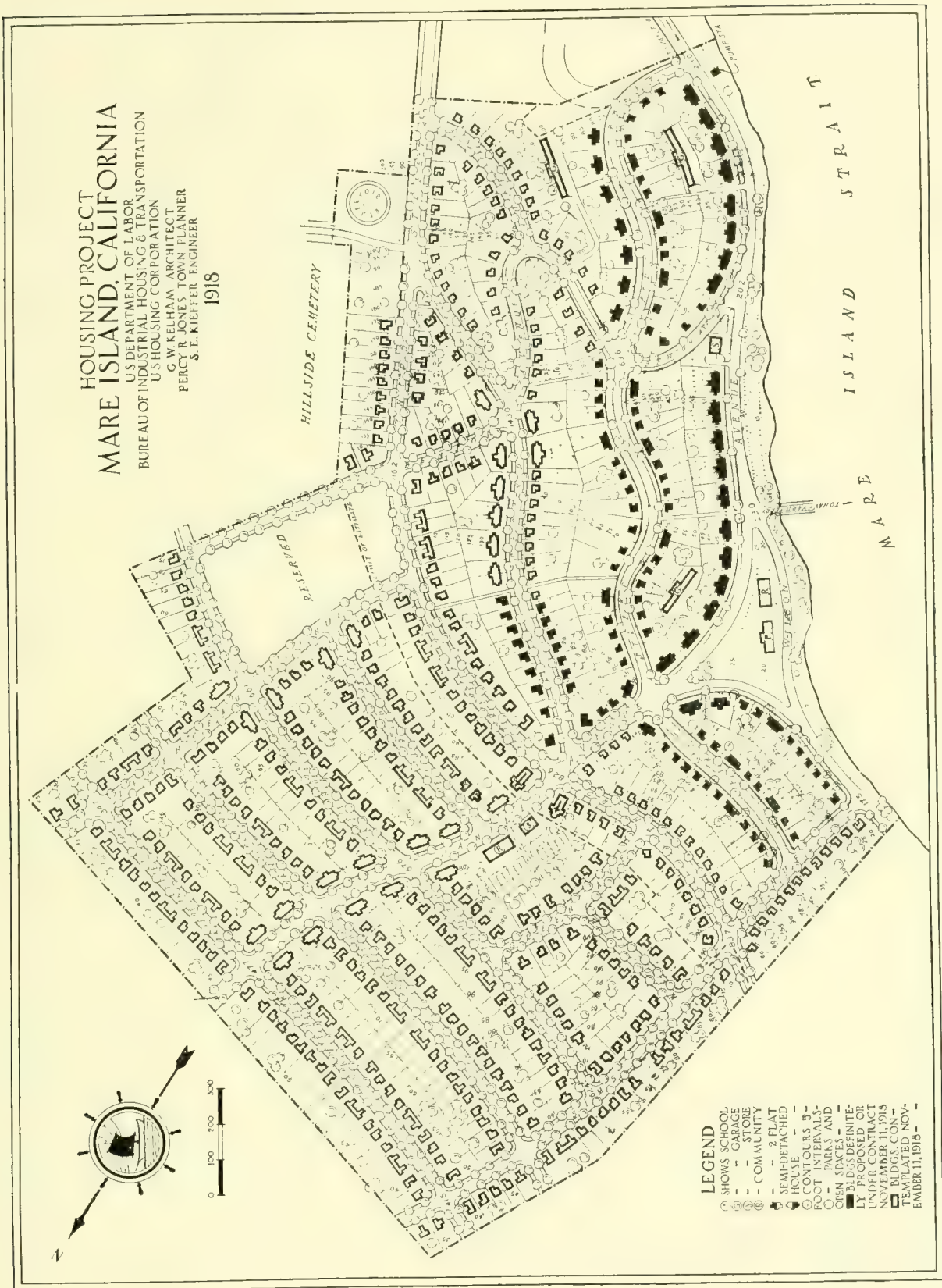
Some houses are clapboarded while others are shingled and a few are stuccoed either partially or entirely. Wood shingles have been used for all roofs.

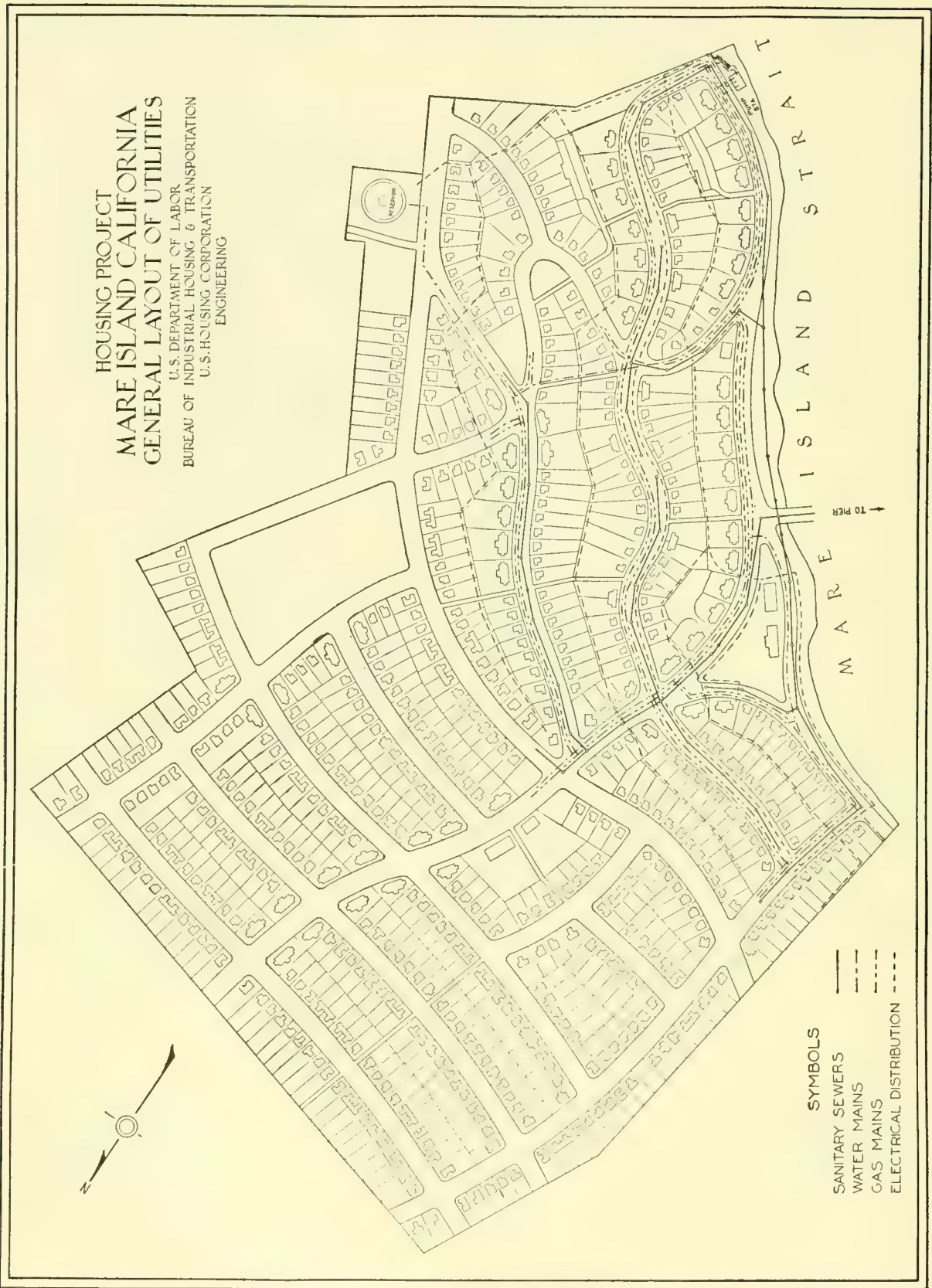
In many of the houses built elsewhere under war conditions there is a certain paucity of ornamental woodwork. Projection of eaves has been cut to a minimum and piazzas made as small as possible. At Vallejo the absence of porches in many of the houses is noticeable, houses which under ordinary conditions seem to require this appendage. The eaves, however, are about as they should be as a matter of design, though some of the cornices are meager; the details of entrances are all very interesting in appearance.

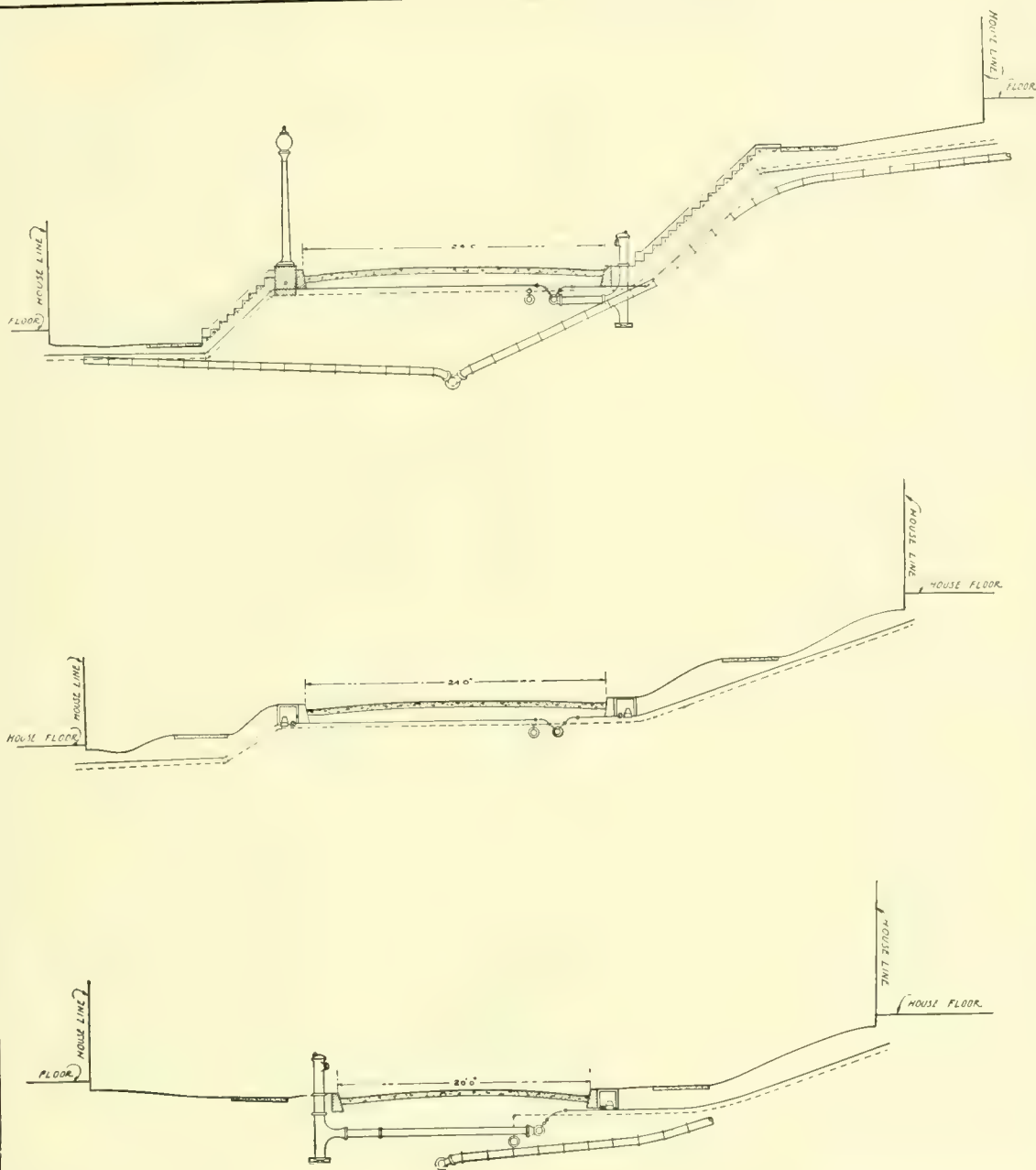


HOUSING PROJECT MARE ISLAND, CALIFORNIA

U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING & TRANSPORTATION
U.S. HOUSING CORPORATION
G.W. KELHAM, ARCHITECT
PERCY R. JONES, TOWN PLANNER
S.E. KIEFFER, ENGINEER
1918

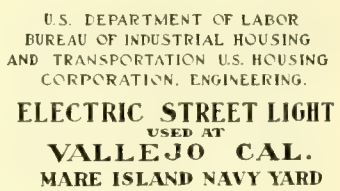


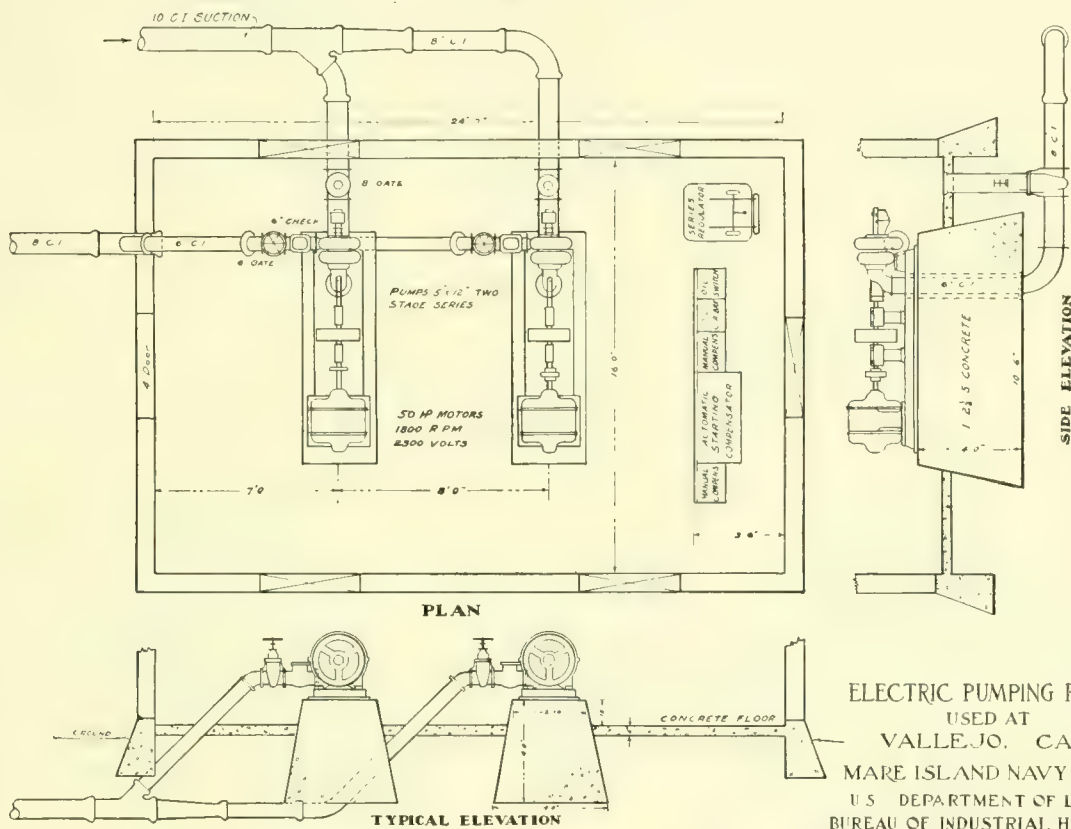




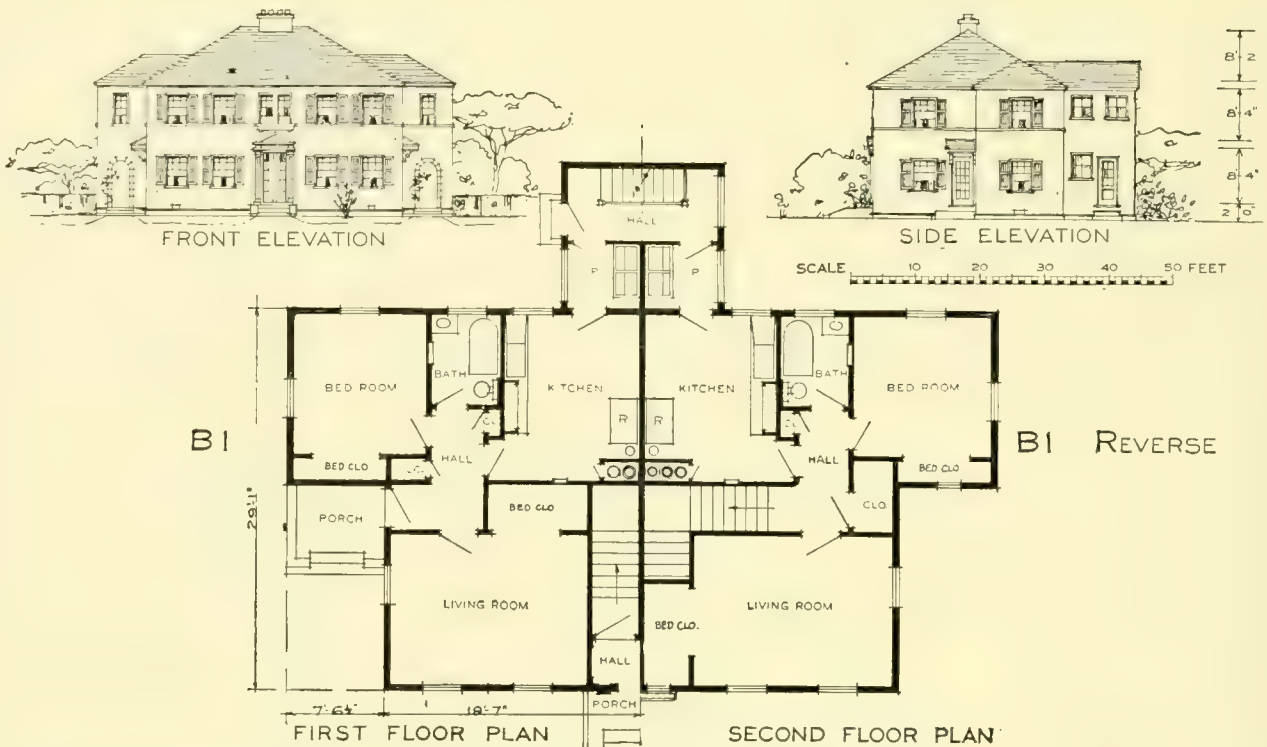
TYPICAL SIDE-HILL STREETS
AS ARRANGED AT
VALLEJO, CAL.
MARE ISLAND NAVY YARD

U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION, ENGINEERING.



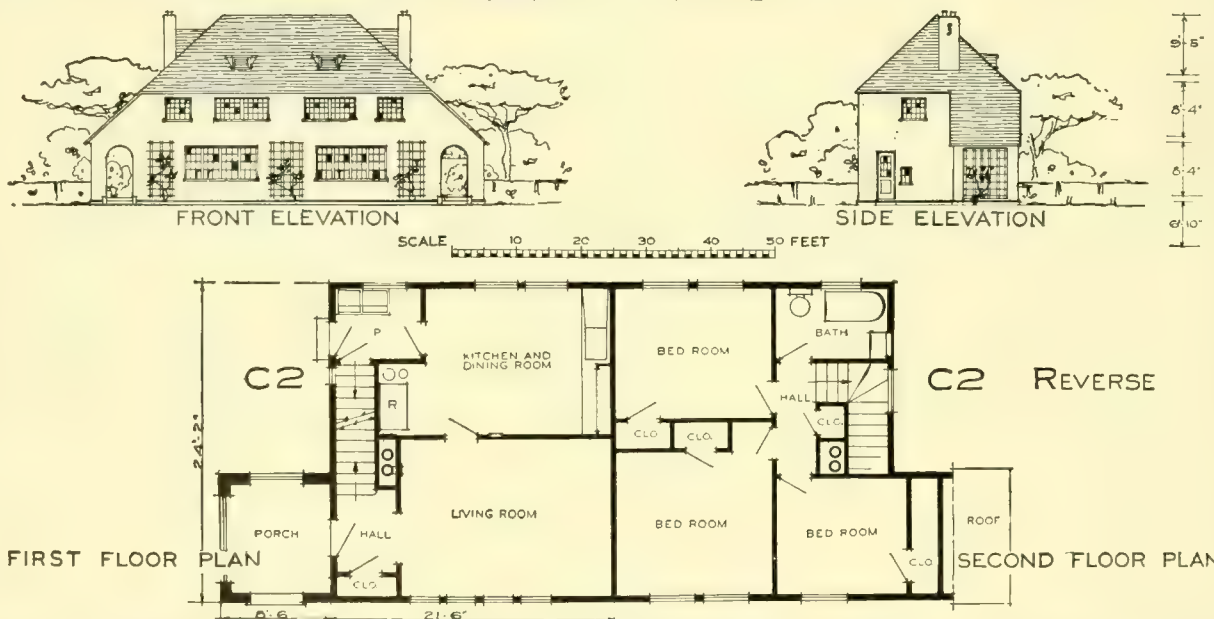


ELECTRIC PUMPING PLANT
USED AT
VALLEJO, CAL.
MARE ISLAND NAVY YARD
U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING
AND TRANSPORTATION U.S. HOUSING
CORPORATION. ENGINEERING.



SEMI-DETACHED TWO FLAT HOUSES TYPES B1 AND B1 R

SCALE 5 10 15 20 25 FEET

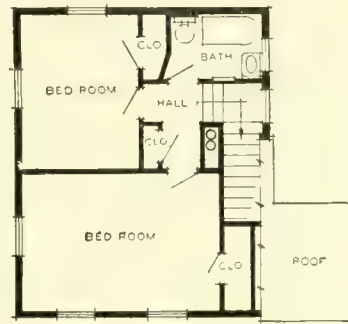
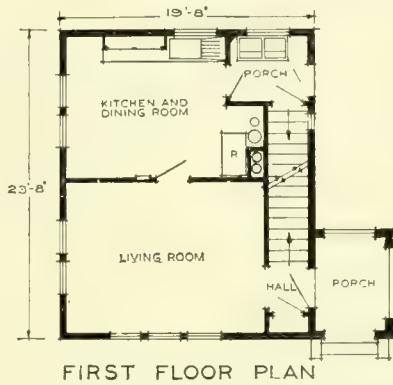
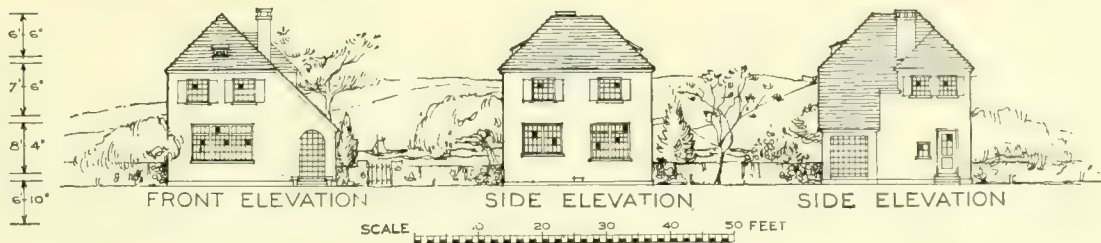


FIVE ROOM SEMI-DETACHED HOUSES TYPES C2 AND C2 R

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT MARE ISLAND CALIFORNIA

ARCHITECT GEORGE W KELHAM



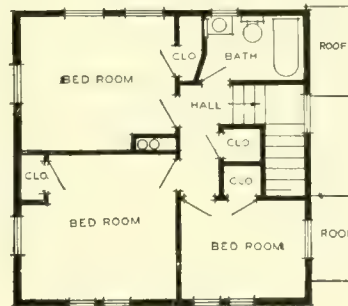
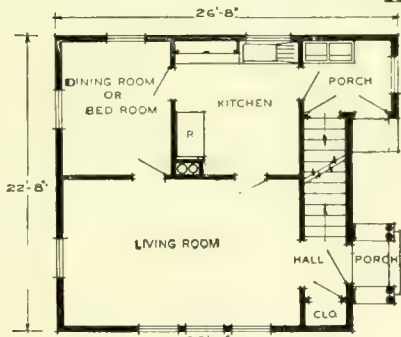
FIRST FLOOR PLAN

SECOND FLOOR PLAN

FOUR ROOM HOUSE

TYPE F 1

SCALE 5 10 15 20 25 FEET



FIRST FLOOR PLAN

SECOND FLOOR PLAN

SIX ROOM HOUSE

TYPE D 1

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT MARE ISLAND CALIFORNIA

ARCHITECT GEORGE W KELHAM

MUSKEGON, MICH. (PROJECT NO. 997).

McGRAFT TRACT.—Area planned: 45.60 acres. Housing planned: Detached houses, 248 families.

SCHOENBERG TRACT.—Area planned: 5.19 acres. Housing planned: Detached houses, 30 families.

(Project discontinued. For further information see tables, Chap. IX. Plan shows revision, giving 269 lots.)

Muskegon, Mich., is located on the southern shore of Muskegon Lake, a body of water 5 miles long and 2 miles wide, separated from Lake Michigan only by a ridge of sand dunes which its outlet pierces. Muskegon Heights is located inland about 3 miles south of the business district of Muskegon. The two cities have grown together and there is no boundary line between them recognizable on the ground. Muskegon has increased in population from about 20,000 in 1913 to about 40,000 in 1918, and Muskegon Heights has increased from about 3,000 to about 10,000. There was a shortage of houses even before 1914 and the war work has greatly aggravated this.

There are three groups of industries, one located in the western part of the city, one in the north-eastern, and one in the southern part. It was first expected that three housing sites would have to be chosen. The principal industrial plants are Continental Motor, Linderman Steel & Machinery Co., Brunswick, Balke, Collender Co., and the Campbell Wyant Foundry. All of these were doing more or less war work. The total number of employees, including a number of smaller plants, was about 9,000 and the additional help needed was about 1,500. The first site chosen was that known as the McGraft farm tract, which includes a piece of the McGraft farm and one or two additional properties. This site is located in the western part of the city about three-quarters of a mile back from the lake shore. The most of the land is flat, there being, however, a precipitous slope about 20 feet high along the western side. The soil is a pure sand for a depth of from 5 to 50 feet, under which is an impervious clay.

The electric street railway line passes near one side of the development and gives very good transportation to the business district and most of the industries.

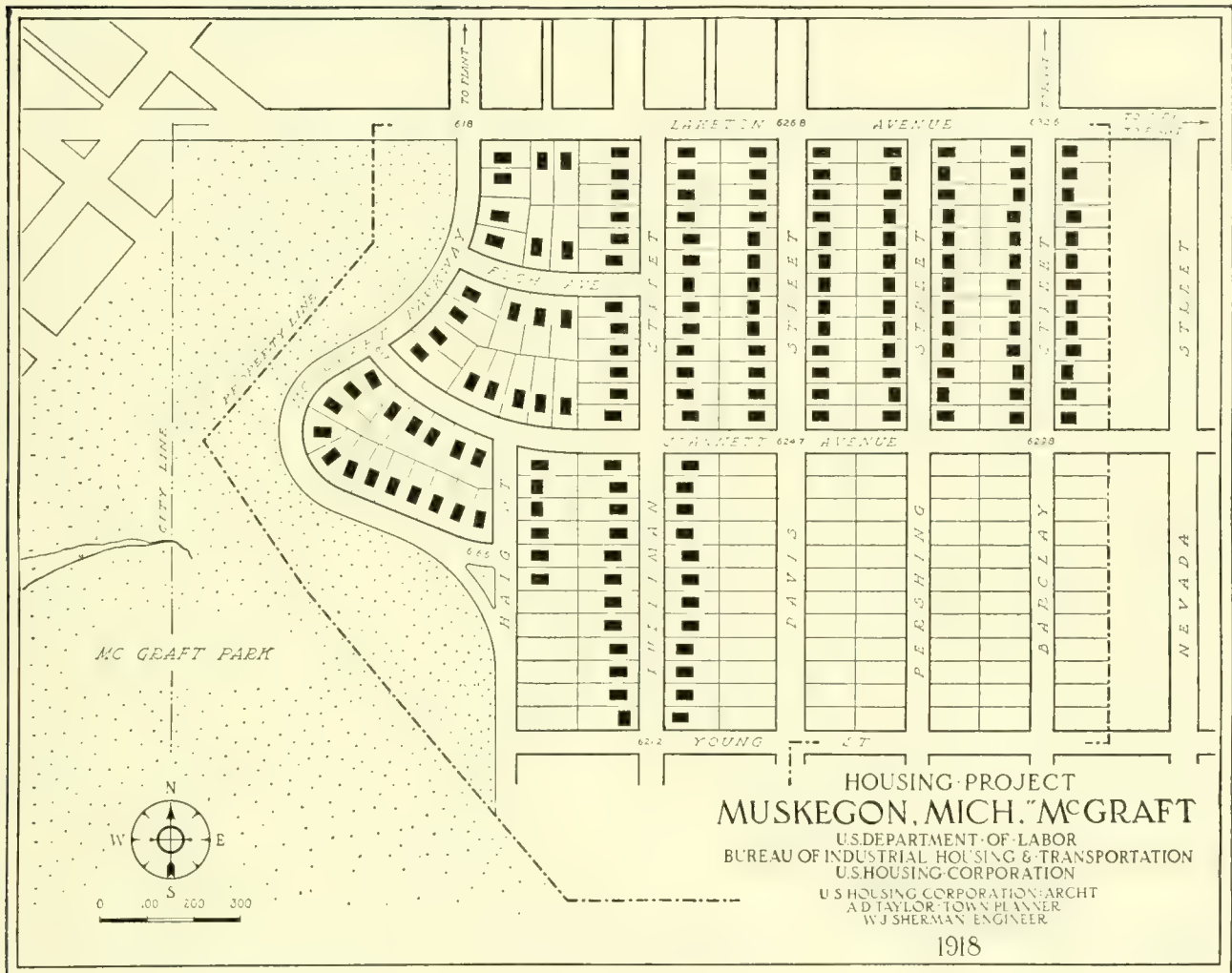
There are good schools in Muskegon, but for the houses proposed for this tract it would probably have been necessary to increase the school facilities in this district. All other facilities were ample within the city.

The second site chosen was one on plotted land in Muskegon Heights known as the Schoenberg tract. The ground here is perfectly level, there being not 1 foot variation from one end to the other. The soil here is also sand for variable depths. There are good transportation facilities, schools, churches, and stores in the vicinity.

The Schoenberg tract development accepted the existing streets of the town. The street arrangement of the McGraft tract also continued the existing streets, there being little excuse for any other layout on the flat upper ground; but along the edge of the valley a curved street carried through traffic on pleasant lines. The corporation bought a part of this valley and it was proposed to turn this over to the city as a park, thus contributing to connect the existing McGraft Park with our development, bringing considerable benefit both to the city and to the housing project.

The plans and estimates had been carefully worked out in detail, and work was about to proceed when halted by the armistice. We show planting plans from this set of drawings as an example of one way of representing wholesale planting which is simple and to be often repeated with minor variations. (See pages 44 and 45.)





NEVILLE ISLAND, PA. (PROJECT NO. 880).

Area planned: 500 acres. Housing planned for 2,000 families.

CORAOPOLIS.—Area planned: 15.16 acres. Housing planned: Detached houses, 32 families; semidetached houses, 34 families; row houses, 9 families. Total, 75 families.

(Projects discontinued. For further information see tables, Chap. IX.)

With the opening of the war it was soon determined that it would be advisable to construct a large gun foundry and shell finishing plant to be owned by the Government. Accordingly an agreement was entered into with the United States Steel Corporation to construct such a plant, which would produce cannon of the largest size for use either in Europe or for coast protection at home.

On account of the enormous size and weight of these guns and the amount of material needed a centralized but protected location was necessary, which on general principles would be established and maintained in the heart of the iron and coal region a safe distance from the coast and available for either railroad or river transportation. Accordingly Neville Island, adjacent to Pittsburgh, Pa., was selected as a site for the plant.

Neville Island comprises a township of Allegheny County, Pa., and is an island 6 miles long and from one-third to one-half mile wide, lying in the Ohio River 2 miles from the corporate lines of the city of Pittsburgh, Pa.

The principal housing site recommended by the investigating committee lies adjacent to and paralleling Neville Island on the south bank of the Ohio River and comprises the greater part of Kennedy Township and the northwest corner of Stowe Township, all in Allegheny County.

Among the reasons for selecting this site was the fact that the Neville Island factory was to be a permanent industrial plant, demanding a permanent town serving the plant, but independent of it and comfortable and convenient; a city that would be capable of attracting and holding first-class labor and having all modern conveniences and facilities, with a sufficient area for the location of 5,000 to 10,000 houses and a possible population of 100,000 people. The only site of sufficient area meeting these conditions within available distance of Neville Island was the adjacent high ground which, while presenting some seeming difficulties from the point of view of construction, is not mate-

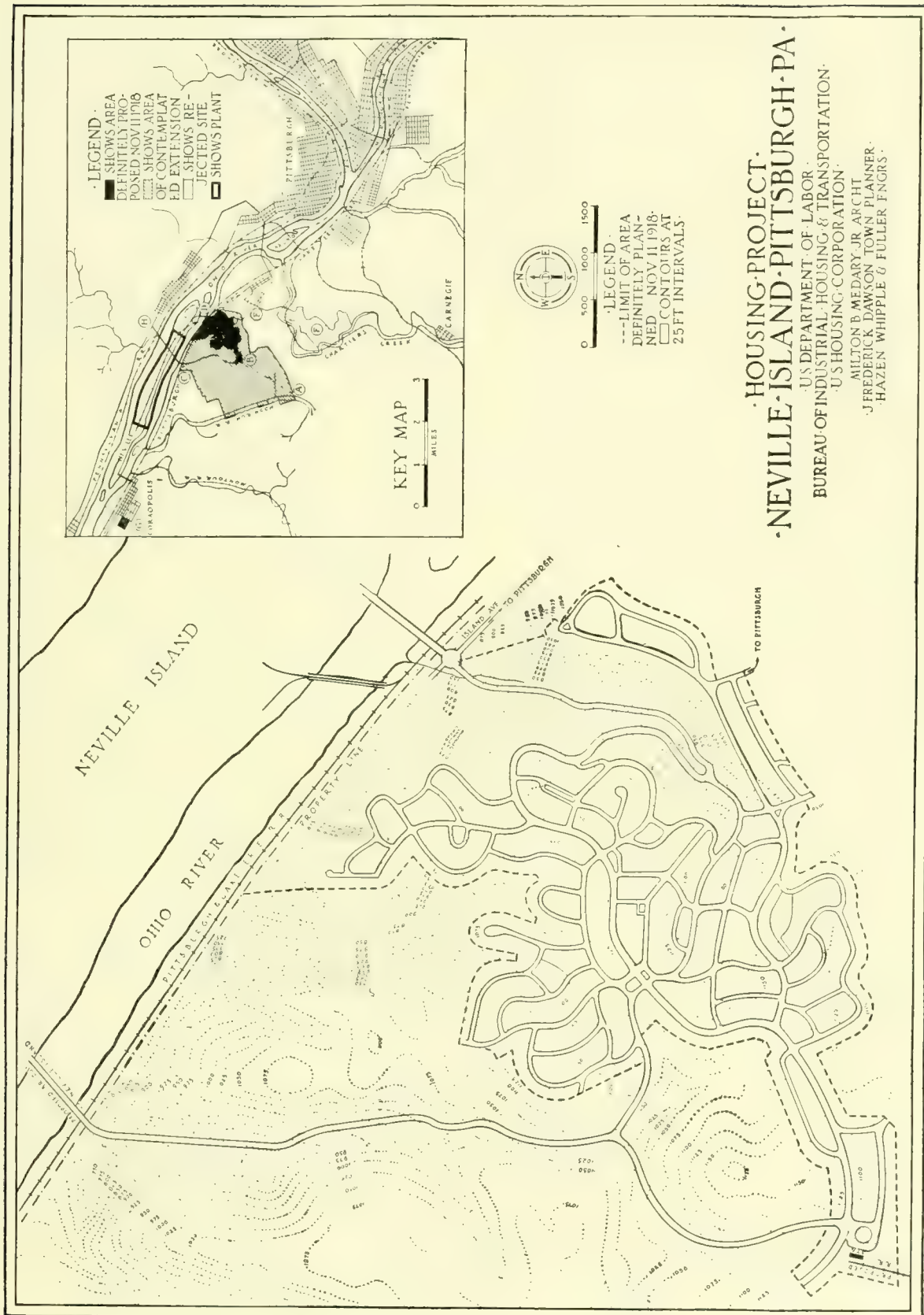
rially different from the sites on the northern side of the river where many attractive developments have been made. In fact, the site is not more difficult than the average land around Pittsburgh.

The site has a one and a half mile frontage on the Ohio River but is high above it, the elevation of the high water being 725 feet above sea level, and of the main part of this tract about 1,200 feet. The tracks of the Pittsburgh & Lake Erie Railroad Co. occupy the immediate water front and the front of the site rises 75 to 100 feet in a rock cliff at the right-of-way line and then in an abrupt slope for about 200 feet more to the first bench. The frontage is cleft by four principal small water courses, named in order: Shane Hollow, Neville Run, Porter's Hollow, and Brightwood Hollow along the Ohio River front. Moon Run Hollow is a much deeper and more marked gulch to the rear of the property on the west and south sides, up which the Pittsburgh & Moon Run Railroad runs, which for the present at least is the main means of transportation.

The surface of the site is a rough rolling plateau and while not adapted for industrial purposes is a beautiful tract from the æsthetic standpoint, and would make an ideal city of homes.

In its present state it is not accessible to Neville Island or practically any of the adjacent cities by foot, auto, or railroad, except from the south or rear at an elevation 400 or more feet above the Ohio, and from the northeast corner where a grade of 300 feet must be overcome to reach the first bench; therefore in the utilization of the site the paramount question is seen to be the transportation to and from the city site.

In the street system as proposed the main approach from the plant starts with the existing Neville Island Bridge. Two hundred feet away the road intersects the main road from Pittsburgh, whence it climbs the slopes by a gradual rise not exceeding 5 ½ per cent until it reaches the plateau above where it makes a short abrupt



turn and generally skirts the edge of the hill until it reaches the main store center represented by the rectangular street plan to the west. From there it continues almost directly to the railway station at the southwest corner of the project. To the east halfway between the station and store center the road divides and indirectly seeks the abrupt turn at the top of the slope mentioned above. These two branches of the main road leading in both directions from the sharp turn to the store take the form of a warped ellipse and together with their branches to the station and bridge constitute the main artery of the street system. Lesser arteries extend out from the ellipse by as direct lines as possible to exterior points of the table-land and become the backbones of minor street systems. They with the minor street system within the ellipse are made to wind with the grades, but only to the extent necessary. This method of street arrangement furnishes building sites with the least cost for street and lot grading and the laying of utilities. Except for the projection of the table-land to the northwest, the store center is, generally speaking, at the highest level of the project, the more important streets of the project leading to it. The open square featuring the store center is the only park affecting the arrangement of the street system, as others occupy whole and partial blocks too steep for building purposes. The stretch of road from the bridge via the sharp turn to the nearest point of the road system above is too long and inconvenient for pedestrian use so that a cross path, not shown on the plan, from the bridge to this point is taken for granted. The same is true of the small branch of the plateau to the east.

The street plan as here illustrated grew naturally from meeting the necessities of the case; access to the upper land from the plant and from the city of Pittsburgh, and utilization of all the land possible in the upper area for housing without excessive street grading or lot grading. The topographic conditions were so severe that no regularity or apparent design of street layout on plan was practicable or reasonable. The kind of aesthetic excellence to be sought was plainly that of picturesqueness, of unexpectedness, of careful and interesting adaptation of means to ends in a multitude of individual cases. To get even tolerable results, economic or aesthetic, under these circumstances, particularly when speed is essential, the work must be studied at first hand on the ground.

The Housing Corporation appointed its committee of designers, constructed offices for them on the ground, authorized them to collect their office and field forces, and the design had come to the general conception here shown, and some actual preliminary construction work and shipping of materials was under way when the armistice suddenly ended the whole venture in midcourse.

To call the Neville project a housing development would be to use too limited a name. The magnitude of the necessity called for the construction of a first-class city.

The engineering construction problems of Neville City were of such size that the whole proposition became an engineering operation of great magnitude in which all other phases sank to minor importance. Transportation, both steam and electric, was the prime factor, both in the construction of the city and in its future operation. River transportation also was to be provided.

A spur track for construction purposes was to be run from the Pittsburgh and Moon Run Railway, a distance of about $1\frac{1}{2}$ miles up through the city.

It was found that electric railway service would have to be provided or the city would be a failure. This was to be accomplished by an extension of the lines of the Pittsburgh Railway Co., which primarily would have had to have been built by the Housing Corporation, but ultimately would have been turned over to the local railway.

Highway transportation to and from the site by motor truck and for general auto purposes was necessary, and arrangements were made whereby the county authorities were to macadamize the main highway between Pittsburgh and Neville City at their expense.

River transportation for heavy materials was available, and a dock located at the junction of the Moon Run Railroad with the Pennsylvania Railroad was to transfer materials from boat to cars, and it was also proposed to unload barges and transport material up to the heights by overhead cableway.

For a city of this size in this locality it would be necessary to put in a waterworks system, which if independently constructed would cost several million dollars, but negotiations had been started whereby the Housing Corporation would have only had to spend a small portion of this, and the major part of the cost was to be borne by the city of Pittsburgh, and the water itself would be taken from the city, thereby insuring a safe, pure, and constant supply.

A complete sanitary sewer system would have had to be constructed for the city, and a modern sewage-disposal plant, if the laws of the State of Pennsylvania were complied with.

Owing to the character of the ground and the large area involved, it would have been necessary to construct a considerable amount of storm sewers to avoid wash in the streets and to carry off the large amount of water accumulated at certain points.

Neville being in the heart of the natural gas district it was supposed that gas would be easily available, but it was found that, owing to the large demand for natural gas in the factories working on war supplies, the supply was limited. But the district being accustomed to the use of gas almost entirely, the question was seriously considered of constructing a coal-gas plant to supply the demand. The decision had not been reached on the point when the armistice was announced.

Street lighting was to be furnished by the ordinary incandescent system in series, using overhead construction, except on the main business street. So far as possible, the location of all pole lines was to be in the rear of the lots and house services were to be taken from the poles to the rear of the houses. The local electric companies were ready to enter into an agreement to furnish the electric service.

The Bell Telephone Co. were prepared to furnish the telephone service on their usual basis.

CORAOPOLIS.

Coraopolis is a borough or town of 18,000, situated on the Ohio River in Moon Township, Allegheny County, Pa., about 2 miles below the lower end of Neville Island.

The housing proposed here was to be an adjunct of Neville, and it was contemplated to place about 65 houses here as a measure of quick relief for an urgent demand for houses to accommodate the superintendents and foremen of the plant who would need accommodations immediately.

The site comprises 65 lots in the east part of the borough, on a well-drained side slope, with sewer, water, light, telephone, and gas on the adjoining streets. The street in front of the property is paved, and the sides are curbed and cement walks down. The whole lies on a side hill slope in a pleasing locality and immediately adjoining a large new school house.

As the borough had already constructed the main lines and all utilities around this property there were but a few short extensions and connections to be made, and it was immediately available.

By the time of the armistice plans had been made for such utility extensions as were to be constructed. House plans had been prepared and bids taken and accepted. The city had started a little grading on the roads and work would have been in progress in a few days.



NEWARK DISTRICT (PROJECT NO. 17).

We include the following statement of the transportation activities of the Housing Corporation in the Newark district, as a striking example of the interrelation of our housing projects with transportation relief. In this district, where local housing shortage so seriously limited the output of war materials most urgently needed, the remedy applied was largely transportation, and this remedy was evidently, as far as it went, cheaper and much more immediate than constructing new housing.

JERSEY CENTRAL TRACTION CO.

After an investigation with a view to improving transportation to Perth Amboy and east to Keyport, as requested by the Gillespie Loading Co., (a shell-filling factory at South Amboy, N. J.), an agreement was executed between the United States Housing Corporation and the Jersey Central Traction Co. and the American Railways Co., providing for a loan to be expended as follows:

For specified repairs on bridges, alterations on cars and repair of telephone system, \$51,000; for three second-hand interurban cars, \$12,000; and for possible contingencies, approximately \$5,000.

Also an agreement was made with the American Railways Co., and the Monmouth Lighting Co., a subsidiary company furnishing the electric power for the operation of the Traction Co.'s cars, whereby the Housing Corporation advanced the sum of \$37,136 for additional construction to the power house and a new 500-horsepower boiler.

The power-house addition is under construction and the boiler has been delivered. The repairs specified in the contract with the Jersey Central Traction Co. are in various stages of completion.

ASBURY PARK TRAINS.

In June, 1918, the Transportation Division of the Housing Corporation investigated the transportation facilities for employees of the Gillespie Loading Plant near Morgan, N. J., and the Singer Sewing Machine Co. at Elizabeth, from Asbury Park and Long Branch, as there were available at the latter places many vacant all-the-year houses and hotels.

It was found that the transportation of war workers from these localities appeared feasible, but existing commutation rates were prohibitive. Therefore, the question of special rates for war workers was taken up with the United States Railroad Administration, and a rate of six-tenths of a cent per mile plus 5 cents was established, with a minimum guaranty of \$3 per mile per train. On this basis the fare from Asbury Park to South Amboy would be 21 cents one way, or 42 cents for a round trip of about 54 miles. As this was considered more than the war workers could afford to pay, it was decided that the Housing Corporation would purchase tickets from the railroads at the established special rate and sell the same to war workers through the various manufacturing plants at a uniform price of 30 cents per round trip and absorb the difference charged by the railroads.

On July 18, 1918, a train for the Gillespie Loading Plant was put on from Bradley Beach to South Amboy. This train started with 82 passengers, and inside of a week was carrying between 300 and 400 employees. On July 29, 1918, a second train for the Gillespie Loading Plant was inaugurated from Asbury Park to the Gillespie Co.'s connection near Ernston, stopping at Long Branch and Red Bank. These two trains also served indirectly the California Loading Co. and other smaller war plants.

At the request of officials of the Standard Aircraft Corporation at Elizabeth, an excursion train to Asbury Park was arranged for on Sunday, July 28, 1918, in order that men with families might have an opportunity to find houses at Asbury Park. The regular round-trip fare was 70 cents for adults and 35 cents for children. The Housing Corporation purchased the tickets at the regular fare and sold them to the employees of the Standard Aircraft Corporation at 30 cents for adults and 15 cents for children. The excursion train carried over 2,300 passengers.

On August 19, 1918, a special train for the Standard Aircraft Corporation employees was put on from Asbury Park to Bayway, stopping at Long Branch. Tickets for this train were purchased by the Housing

Corporation at 56 5/6 cents per round trip, based on the special rate established, and sold through the Standard Aircraft Corporation to their employees at 30 cents per round trip. The minimum guaranty on this train was \$234 per day, the total distance being 78 miles. On November 1 this train was extended from Bayway to Elizabethport in order to serve other war industries at that point. Efforts were made to have the employees of the Singer Sewing Machine Co. use the Asbury Park-Bayway train, but the United States Railroad Administration would not permit of this, as the Singer Sewing Machine Co. plant was not engaged 100 per cent on actual war work. From time to time the terminal points for the trains were changed and intermediate stops rearranged as conditions warranted, thereby changing the minimum guaranty and the cost of tickets to the Housing Corporation, but the tickets were sold to employees at the uniform rate of 30 cents per round trip, regardless of the distance traveled. Ample housing facilities were thus made immediately available for the workers, thereby saving valuable time and great expense which would otherwise have been necessary for building houses near the plants.

Shortly after the signing of the armistice the travel on these trains decreased materially and after November 30 the Standard Aircraft train was discontinued and one of the Gillespie trains extended to Bayway. On January 31 one of the Asbury Park-Gillespie trains was discontinued. It had been planned to take off both trains on this date, but owing to representations of the Supply Division of the Ordnance Department, which had taken possession of the Gillespie plant and were continuing loading, one train was continued in order to give them time to readjust some of their labor supply.

The special-ticket privilege for the Standard Aircraft Corporation was discontinued after February 15, and after March 17 single-trip tickets were sold to the Gillespie plant at 24½ cents each, thereby relieving the Housing Corporation of any further differential. Arrangements were made to discontinue the last Asbury Park-Gillespie train after April 30, 1919.

The attached table gives as an illustration information in regard to the operating results from one of these trains:

Asbury Park-Gillespie No. 2, Pennsylvania Railroad, started July 18, 1918, ended Jan. 31, 1919.

ROUND TRIP FIGURES.

Distance.....	July 18-27, 50 miles.	July 29-Sept. 3, 61 miles.	Sept. 4-Oct. 4, 65 miles.	Oct. 5-Jan. 31, 59 miles.
Tickets bought....	\$0.42½	\$0.46½	\$0.49	\$0.49
Tickets sold.....	.30	.30	.30	.30
Differential cost....	.12½	.16½	.19	.19
Daily guarantee....	168.00	183.00	195.00	177.00

	Average number of employees each way.	Total cost to bureau.	Cost to bureau per employee.	Total cost to employees.	Cost to employee per em- ployee.	Total revenue to railroad.	Revenue per train- mile.
Total for July.....	2,729.5	1,469.89	6.46	818.85	3.60	2,066.66	3.08
Daily average.....	227.5	122.49	.54	68.24	.30		
Total for August....	7,829.0	2,530.25	8.72	2,348.70	8.10	4,965.04	3.01
Daily average.....	290.0	93.71	.32	86.99	.30		
Total for September..	12,762.0	2,453.57	4.75	3,828.65	7.50	6,362.62	3.93
Daily average.....	510.5	98.10	.19	151.15	.30		
Total for October....	13,794.0	3,125.01	5.78	4,138.20	7.05	7,490.59	4.90
Daily average.....	541.0	122.55	.23	162.28	.30		
Total for November...	14,981.5	2,871.97	5.17	4,494.45	8.10	7,854.18	4.93
Daily average.....	554.9	106.17	.19	166.46	.30		
Total for December...	13,107.5	2,496.20	4.75	3,932.25	7.50	6,466.48	4.38
Daily average.....	524.3	99.85	.19	157.29	.30		
Total for January....	10,532.5	2,057.35	4.75	3,159.75	7.80	5,067.96	3.69
Daily average.....	405.1	79.14	.19	121.53	.30		
Total period.....	75,716.0	17,003.24	37.95	22,720.85	50.70	40,873.53	4.10
Total daily average..	448.0	100.61	.22	134.44	.30	241.86	

NEW BRUNSWICK, N. J. (PROJECT NO. 271).

Area planned: 42.99 acres. Housing planned: Detached houses, 41 families; semidetached houses, 150 families; row houses, 206 families; total, 397 families. Housing constructed: Detached houses, 28 families; semidetached houses, 68 families; row houses, 96 families; total, 192 families.

(For further information see tables, Chap. IX.)

The city of New Brunswick, a manufacturing community in eastern New Jersey on the south bank of the Raritan River at the head of navigation, had in 1918 a population of 40,000, double its population in 1910. Seventy per cent of the people were American born. A fourth of the population were industrial workers. Of the war workers about 10 per cent were women. New houses would be of greatest assistance to the delayed war production if they were occupied by the more skilled of the industrial population. The Wright-Martin Aircraft Corporation and other war industries most needing housing were in the southwest of the town along the main line of the Pennsylvania Railroad. The Wright-Martin plant was equipped in such a way that it could be readjusted, even at short notice, to the manufacture of sewing machines, cash registers, and similar products. Therefore, the greater part of their war force of 2,500 to 3,000 workers could be considered as permanent.

A footbridge over the railroad was built at Sanford Street for employees of the Wright-Martin plant living across the tracks. The Housing Corporation assisted the contractor in obtaining priorities on material for this. Arrangements were made to have the through train leaving New Brunswick at 6.15 p. m. stop at Manhattan Transfer for employees living in Jersey City.

As the regular trains between Trenton and New Brunswick arrived too late and left too early a special workmen's train was arranged for. A special rate of 30 cents per round trip was made to the workmen, the Housing Corporation absorbing the differential of $10\frac{2}{3}$ cents from the regular fare.

Since the armistice there are fewer workers employed near the project who demand housing, therefore we are now considering the construction of a street extension of about 2,400 feet and the loan of approximately \$30,000 to the Public Service Railway Co. so that the housing development will be more accessible to the center of New Brunswick.

The price of available land was comparatively high, because most of the outlying property, though largely undeveloped, had been lotted and held for

sale on easy payments, and scattering houses had been built. Of the several tracts considered for a housing development, the one shown on our plan was chosen because it was no higher than others in price, of gentle slope and easy to subdivide, close to city utility mains, and but one-third of a mile distant from the Wright-Martin plant via Jersey Avenue with no intervening grade crossings.

Its nearness to the railroad made the delivery of building material easy. The natural slope is just sufficient to give good surface drainage into the creek without large expenditure for storm sewers.

On one side it adjoins Somerset Street, which forms part of the main automobile road from New York to Philadelphia, known as the Lincoln Highway, so that this project when completed will be interesting to tourists along this thoroughfare.

Mitchel and Quentin Avenues are the arteries of the project, leading traffic from the other streets, which are short and wholly local, directly to Jersey Avenue and the industries. The central portion of the plan is on a rectangular basis, which if carried out mechanically over the whole tract would form a "gridiron" of 60-foot streets with blocks 700 by 200 feet. This gridiron is successfully modified in several ways for reasons of economy as well as for attractiveness. Mitchel, Quentin, and Baker Avenues make a bend to enter Somerset Street at right angles. Quentin and Baker Avenues are curved to avoid an expensive fill in the steep-sided creek valley, and to preserve it as a narrow park, with an open brook channel instead of a costly storm sewer. The street vistas are reduced to a reasonable length and generally terminate very pleasantly within the development. The island of planting at the main entrance is important for this reason. The roadways, all with light gradients, are of bituminous macadam with curbs along the gutters. The public alleys were introduced partly for access to the rear of the row houses, but also as rights of way for the electric pole lines, which would otherwise, under local regulations, have had to be located in the streets.

The island in front of the store group, surrounded by roadways, marks the entrance to the project. Following the creek is a long parkway bordered by the two roadways of Baker Avenue. Langley Green is on the northeast axis of the school-house, and a playground, hardly large enough taken by itself, is on its southwest axis. At the southwest corner of the project is another playground bordered by a roadway.

The houses are generally well oriented, northeast and southwest. The symmetrical groups of buildings on Baker Avenue and Langley Green are especially effective. In execution the framing of the outside of the bend of Lufbery Avenue is not as successful in closing the two vistas of this street as the plan suggests, because the spaces between buildings occupied by the two alley entrances are too wide and two detached buildings on the bend between these openings have their gable ends toward the street. If they had been turned with the length of the houses and of their roof ridges following the street curve, the effect of the entire street would have been greatly enhanced, the more so because the vista down the street from the northwest comes through the gap to an ugly factory in the distance. It is such refinements as these, important in their total effect, that the designers of all our projects were precluded from making by the pressure of speed in getting out the plans. They can seldom be recognized in advance on plan without time for staking and revision on the ground.

The house grouping is also on the whole good at the intersections of Mitchel Avenue with Curtis Place and Wright Place. This sort of diagonal grouping around a street intersection, which can be successfully attempted in town planning only when all four buildings are selected for the purpose as in this case, gives a very pleasant variation in a rectangular system, but in execution suggests the thought that it would seem forced and restless if used more than very rarely, and that it would be better if the buildings had been longer, with their corners projecting slightly beyond the building line of the rest of the street, and if there had been a much narrower space detaching the diagonal buildings from their nearest neighbors. The carefully studied variations in the setback of the houses from the street lines, made with systematic reference to the composition of the building masses, and especially of the roof lines, give a very pleasant relief from the usual flatness of building alignment while

preserving the good qualities of a vista along a frankly straight axis. The designers and the Town Planning Division are agreed that slighter variations in the depth of the setback in relation to the lengths of the recessed portions would have accomplished the result even more pleasantly.

The better houses with larger lots, including both detached and semidetached types, are located mainly on the higher ground, some of them facing on Somerset Street. The row type groups of houses, having smaller private lots, are located mainly in the center of the project surrounding Langley Green. A hedge is planted along the front lot lines, and shrub groups are placed against porches and in lot corners.

To obtain some housing relief as soon as possible, dormitories planned for 200 women and 100 men were located in the southern corner of the development. At the time of the signing of the armistice, six weeks after work was started, these dormitories were over 70 per cent complete, and would have been ready for occupancy inside of two weeks more. Work was stopped at once on this temporary development. The 150 carpenters working thereon were placed upon permanent houses, the dormitories were demolished, and all the material that had been used in them was used in the completion of that part of the permanent work which was already far advanced.

The existing schools in New Brunswick nearest to our site being already full to capacity, except the high school, it was necessary to make grade-school provision for all our contemplated population. As it was too inconvenient to get to the center of the town, a motion-picture theater and some stores had to be provided on the site.

The utilities are extensions of the existing utilities of the city. Their design within the development reflects the compactness and adaptability of the general plan of the project. Excavations are chiefly of rock, or hard shale requiring the same handling as rock excavation. Water is secured from the city, which at its own expense extended mains throughout the development and will collect water rates. A sanitary sewer system of 8-inch and 10-inch pipe is carried out to the project boundary, from which the city provides a 500-foot outlet to a trunk sewer. The main sewers are large enough to serve an area twice that of the present development, because they were constructed before the size of the project was reduced.

One piece of storm sewer 200 feet long was necessary to carry storm water to the creek from a point where the gutters would otherwise be overloaded. More would have been necessary if the originally planned larger area had been developed. The creek, regulated and planted, serves as an open waterway.

Gas is supplied by the Public Service Co., of New Jersey.

Street lighting is furnished by the ordinary incandescent system in series, using all overhead construction, with lighting units supported on metal brackets attached to round wooden poles, painted. So far as possible the location of all poles is not in the streets, but along the alleys, the low-tension wires being allowed along the rear lot lines. House services are taken from the poles to the rear of the houses.

This development is composed of semidetached houses and houses in groups, with a sprinkling of detached houses. The happy combination of the row houses in groups of four, five, and six room houses under long unbroken roofs gives the town layout the effect of large scale, of dignity without monotony, of variety without unrestfulness. The color effect, too, of the green roof slate used throughout, and the general uniformity in the tone of the stucco add to this pleasing effect. Though the stucco is uniform in tone, yet it varies slightly in color due to the different aggregates used, all stucco being livened by a mixture of broken quartz which sparkles in the sunlight. The house designs individually are as excellent as is the whole scheme, all their details being good except where war necessity required the substitution of inferior material and coarse moldings. No better example of this type of development has been erected for the corporation.

A single criticism of the exteriors is possible in connection with the window spacing of some of the houses, where an improvement might have resulted had the windows of the first story been directly beneath those of the second story instead of being in combination as a mullioned window beneath the pier between the two windows above. Especially is this noticeable in the semidetached houses at the intersection of the two cross streets.

One house type is faulty as to plan also, in that for the sake of separating the front porches the principal rooms become interior rooms. The same criticism applies to the end houses of the six and eight room house rows.

This project is notable for the small number of plan types used (from corporation standards), there being only four, five, and six room houses with but slight variations in each.

The position of the stairs, however, is radically different in the end houses of the four-room house rows from that in the interior of the group. The six-room houses only are built detached, while the four and five room houses (as well as the six room) are built semidetached and in groups.

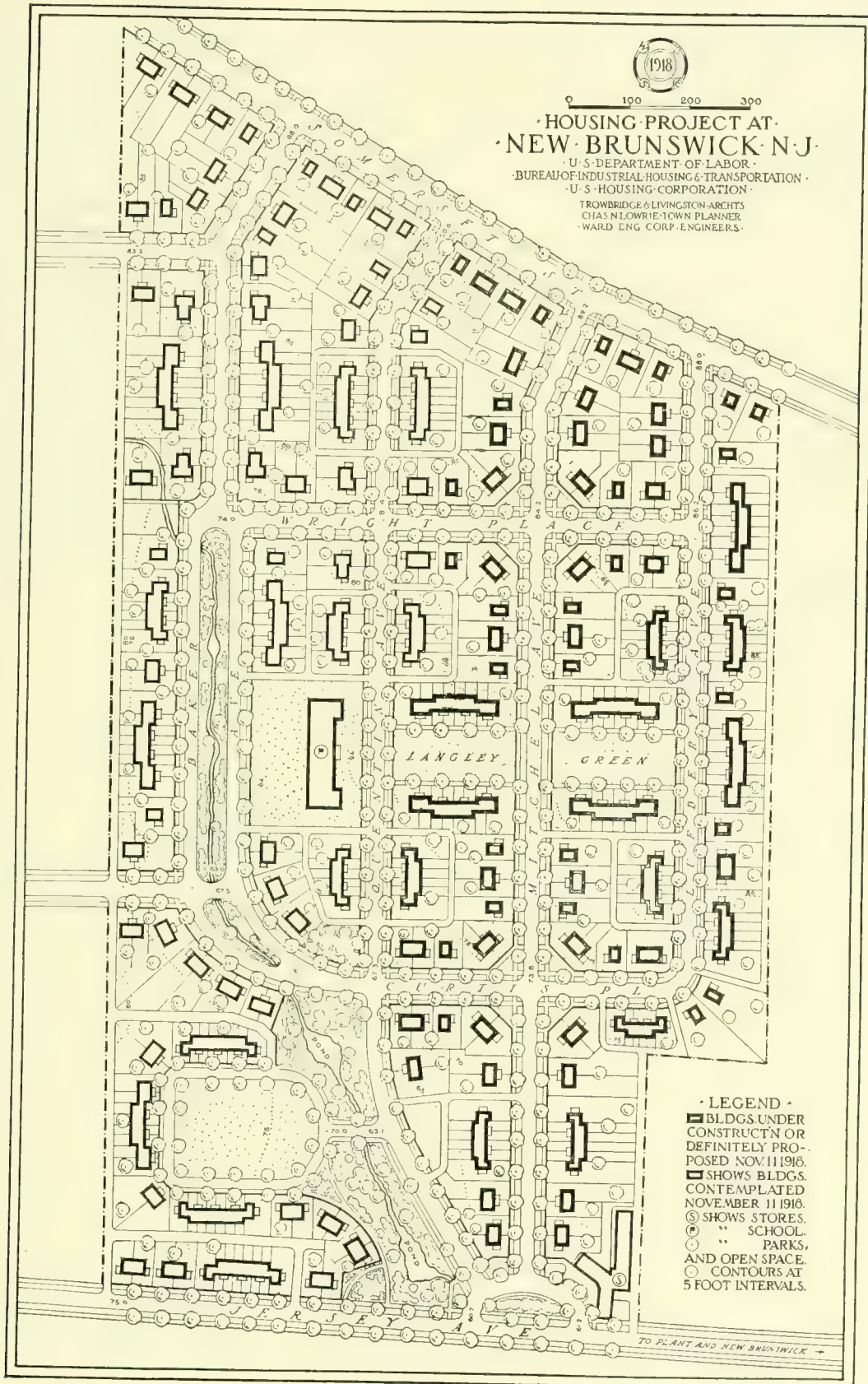
The end houses of the four-room type have the staircase between the front and the rear rooms and parallel to the front of the house, making the living room too narrow for its length, a proportion not so good as in the case of interior row houses of four rooms, where stair space is taken from the end of the living room. A foot or so added to the shorter dimension of the living room, had this been possible, would have been a decided improvement not only in the living room, but also in the room above. In the five and six room end houses the living rooms are in excellent proportion.

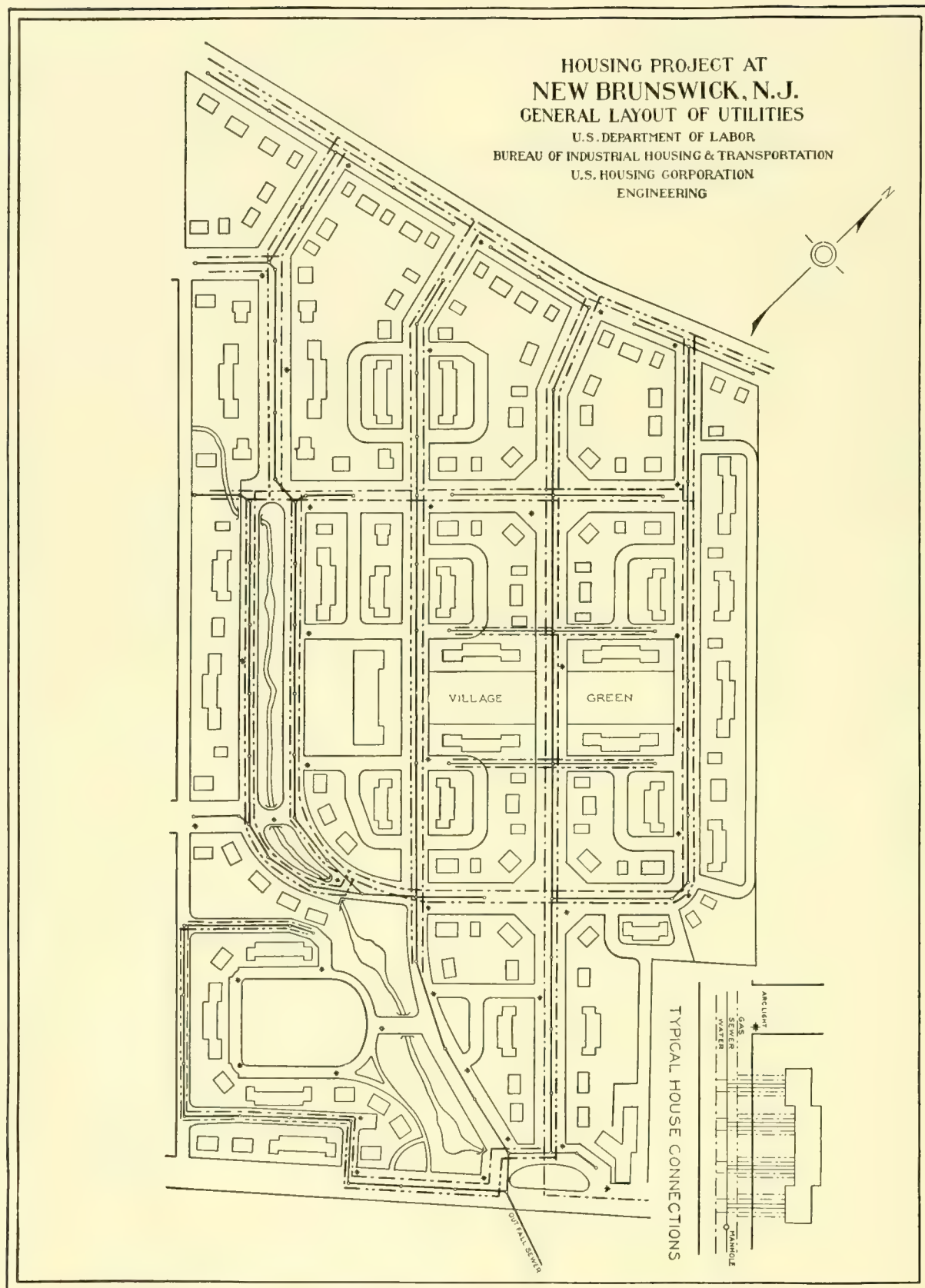
The houses are all semifireproof construction, all outside walls being built of 8-inch hollow tiles. Furring has been omitted. This is bad practice, for unfurred walls generally result in condensation on the inside walls and make it unwise to use wall paper on the rooms. Instead, they must be painted, though even this is often unsatisfactory. It also necessitates the constant heating in winter of unoccupied houses.

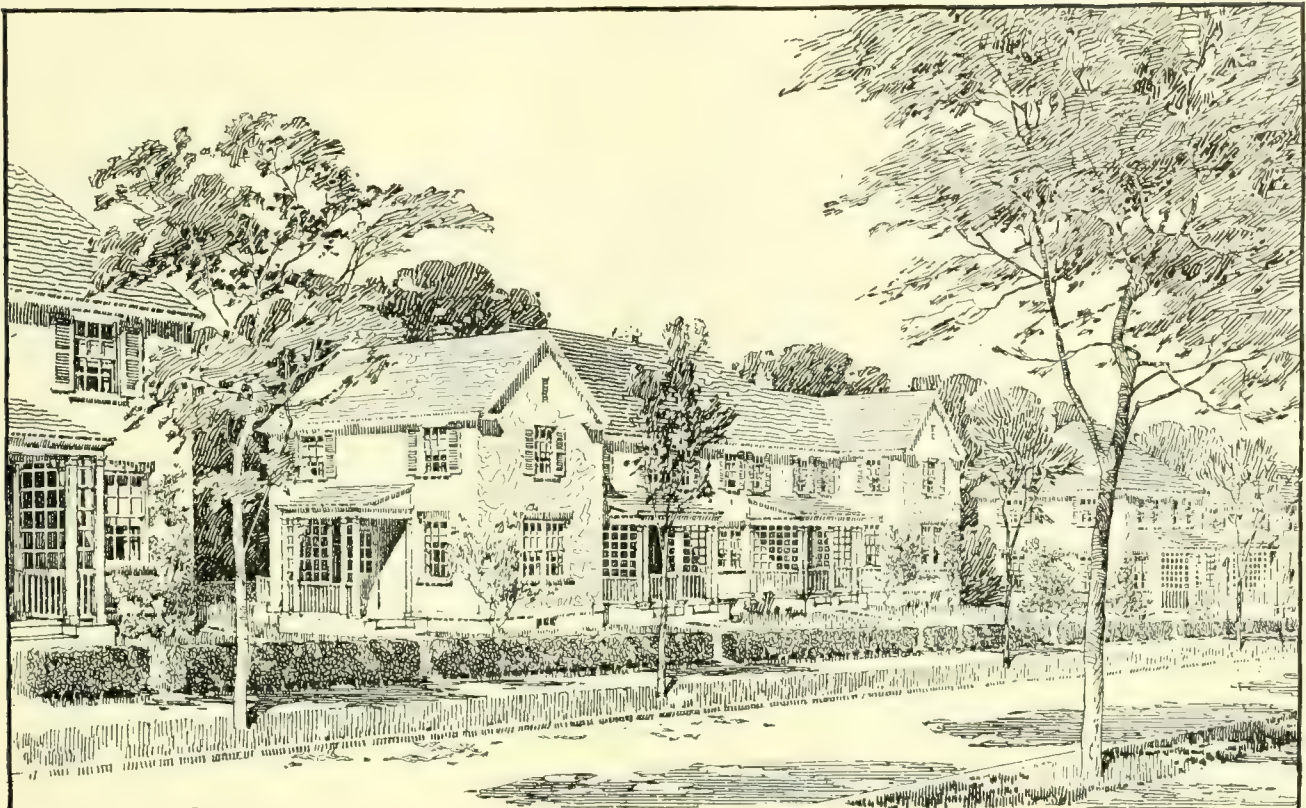
The cellar areas are plastered on the inside with cement over terra-cotta blocks. In this there is the danger of frost throwing the cement by reason of the ground moisture leaking through the blocks and freezing. It might have been better to construct these walls of concrete or to omit the cement plastering.

Owing to the shale rock in which cellars have been dug, these cellars should have been water-proofed.

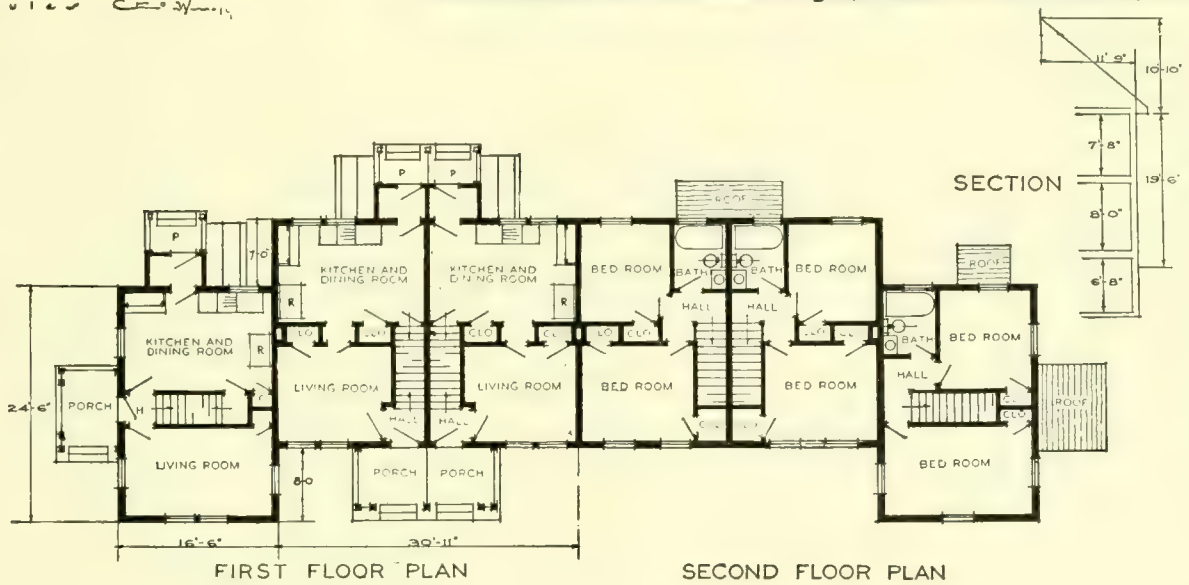
Instead of plastering the extension pantries it would have been better to finish both side walls and ceiling in wood.







W. L. C. 37-10



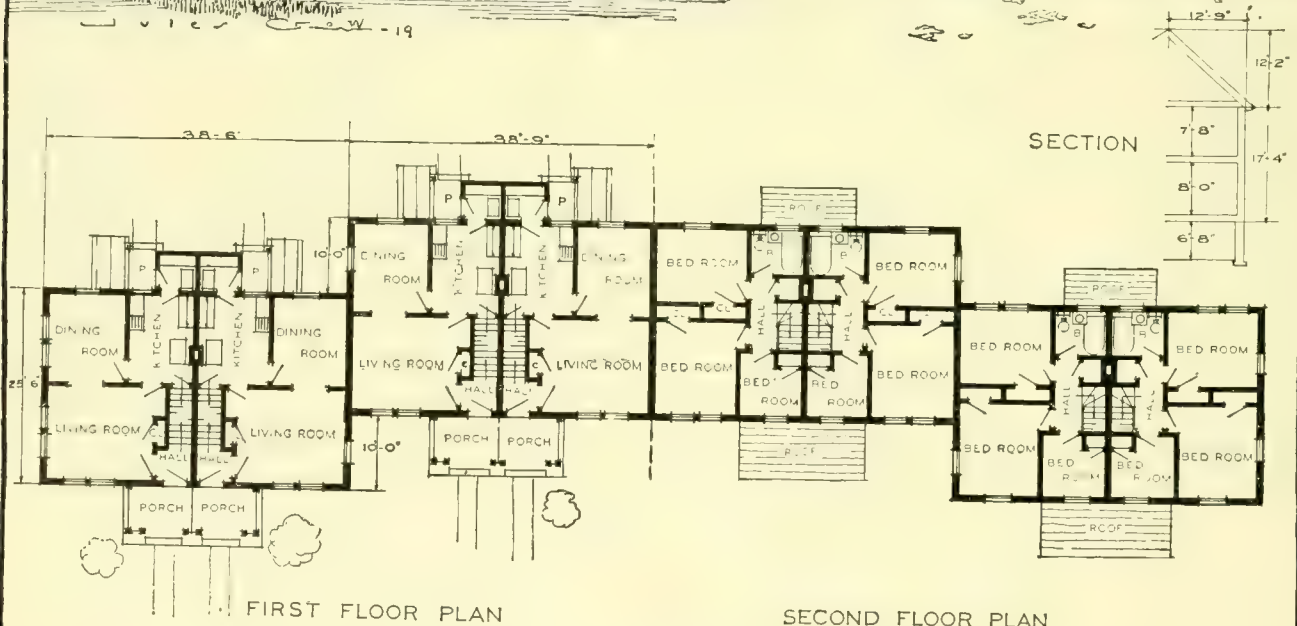
FOUR ROOM ROW HOUSES

GROUP 6-4

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NEW BRUNSWICK N J

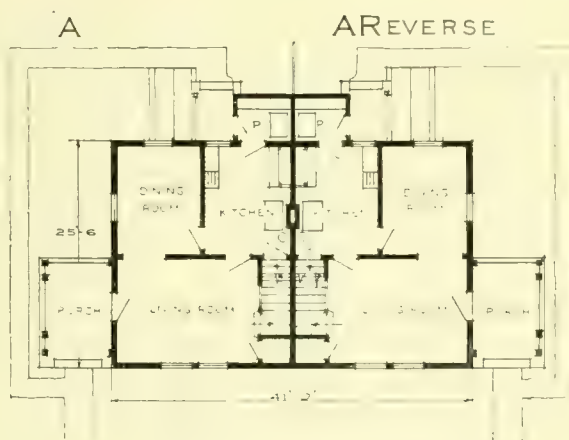
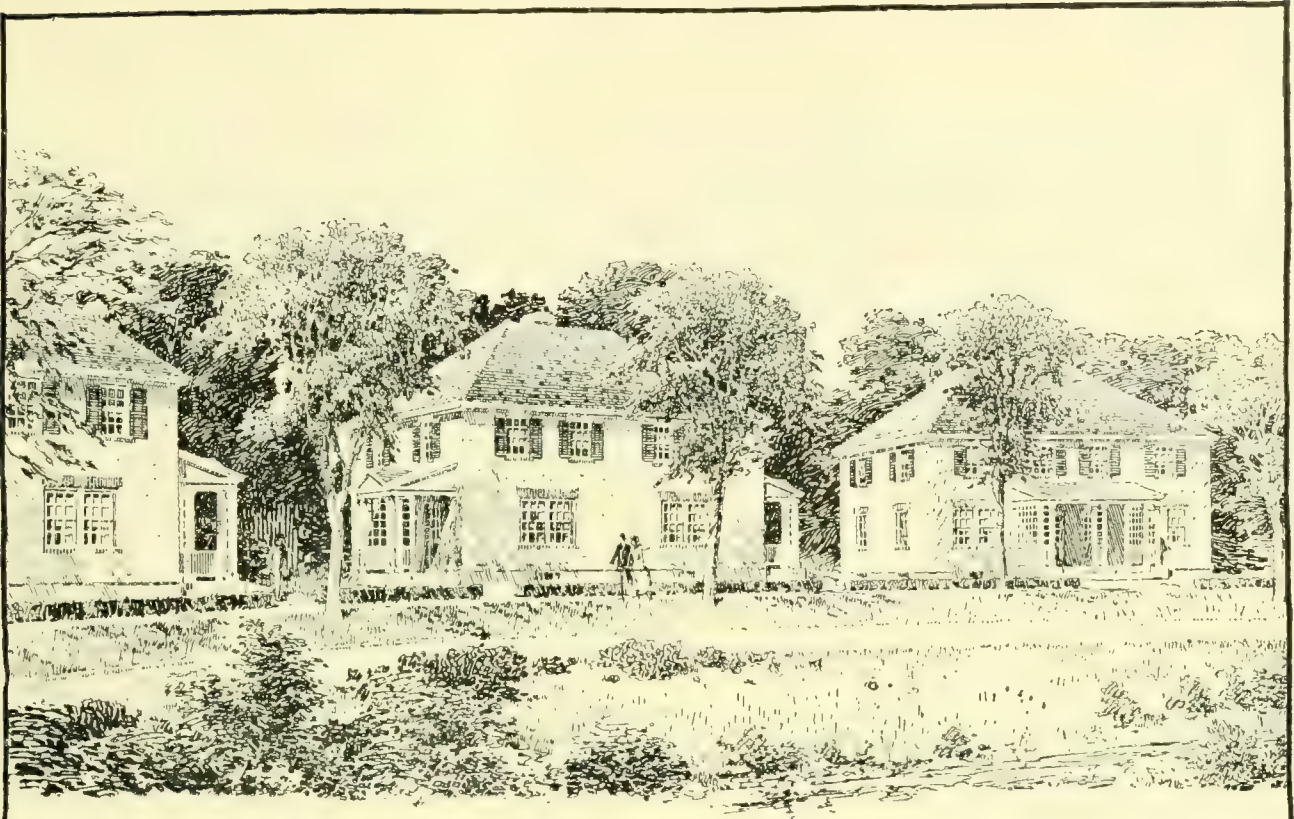
ARCHITECTS TROWBRIDGE AND LIVINGSTON



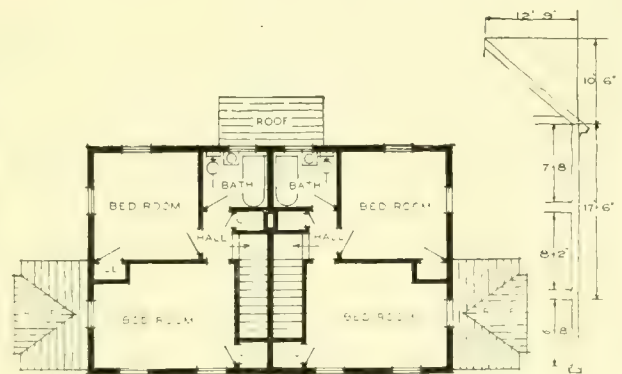
ROW OF SIX ROOM HOUSES GROUP 6-8

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NEW BRUNSWICK N J

ARCHITECTS TROWBRIDGE AND LIVINGSTON



FIRST FLOOR PLAN



SECOND FLOOR PLAN

SECTION

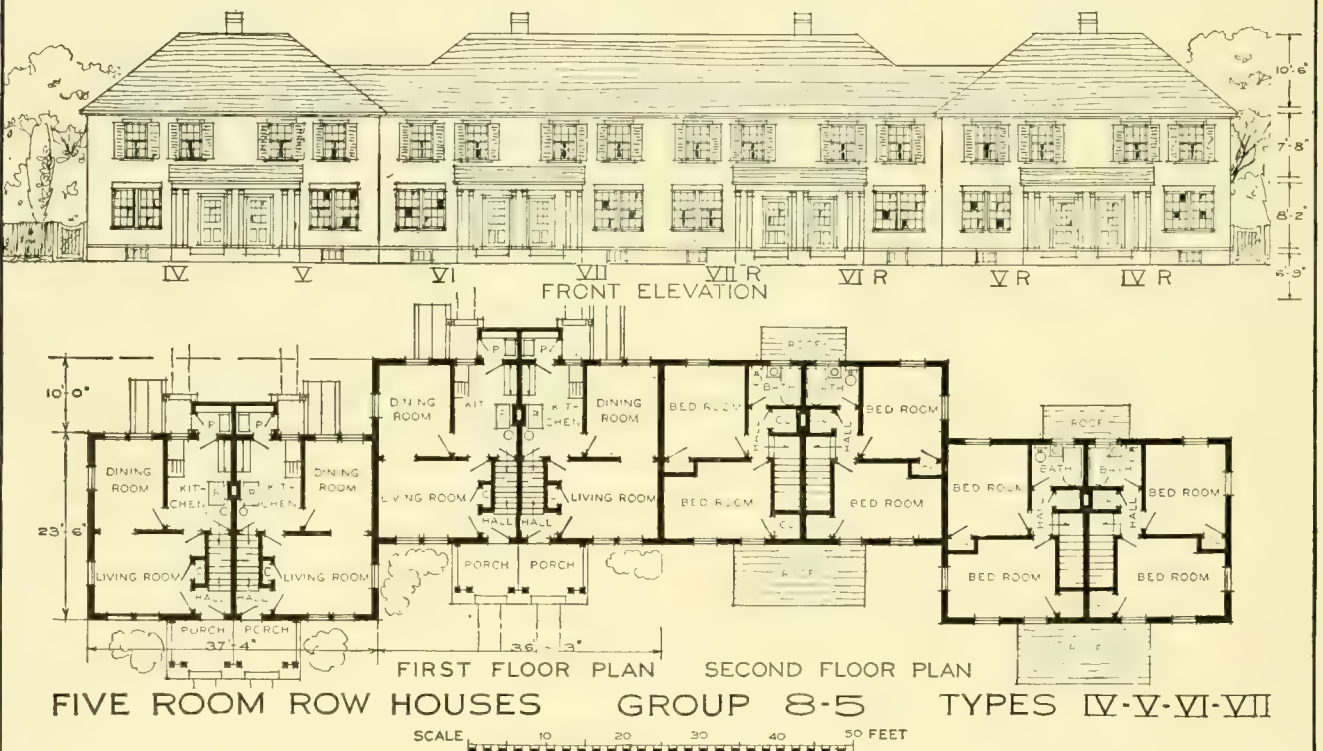
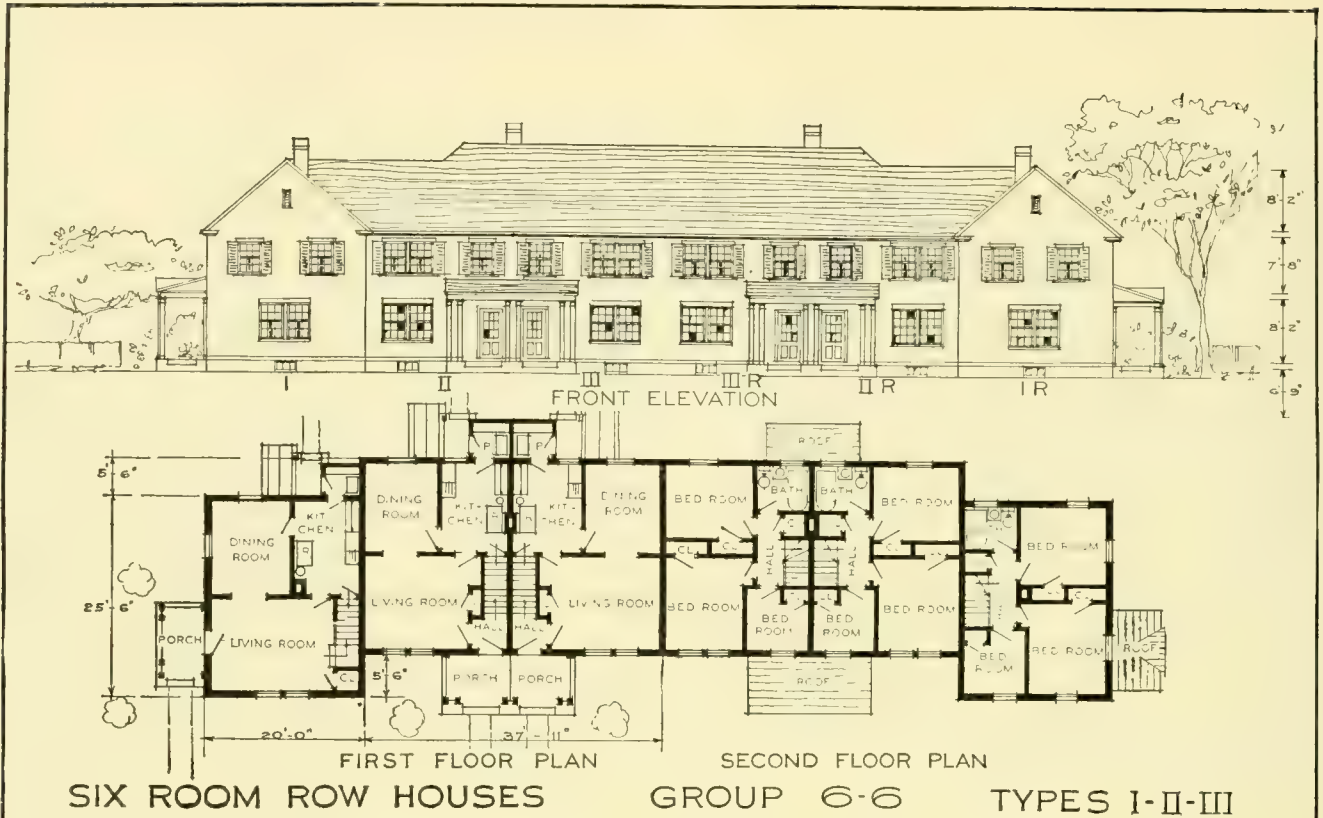
FIVE ROOM SEMI-DETACHED HOUSES TYPE 2-5 A

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NEW BRUNSWICK N J

ARCHITECTS

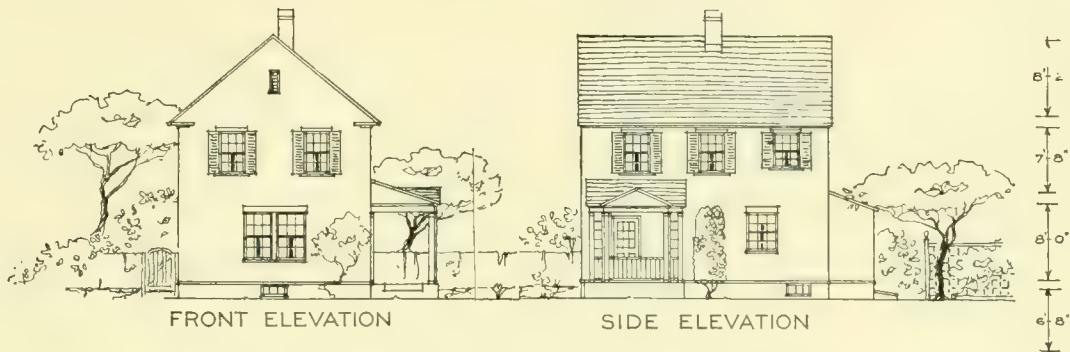
TROWBRIDGE AND LIVINGSTON



UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NEW BRUNSWICK N J

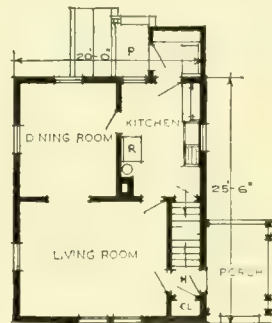
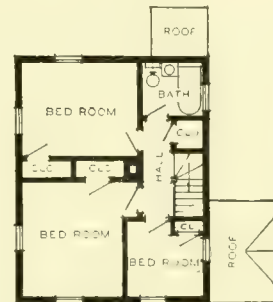
ARCHITECTS

TROWBRIDGE AND LIVINGSTON



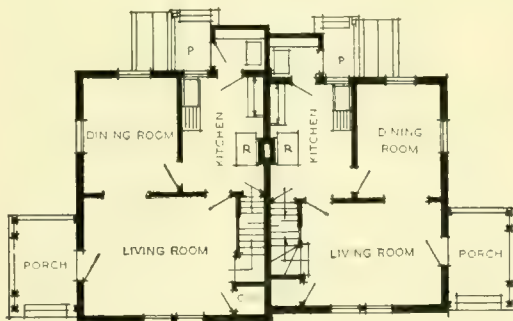
FRONT ELEVATION

SIDE ELEVATION

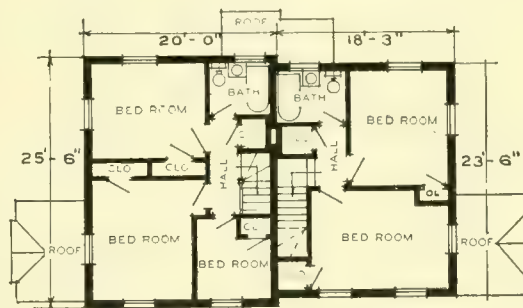
FIRST FLOOR PLAN
FIVE ROOM HOUSESECOND FLOOR PLAN
TYPE 1-6 R

FRONT ELEVATION

SIDE ELEVATION



FIRST FLOOR PLAN



SECOND FLOOR PLAN

FIVE AND SIX ROOM SEMI-DETACHED HOUSES TYPE 2-5-6

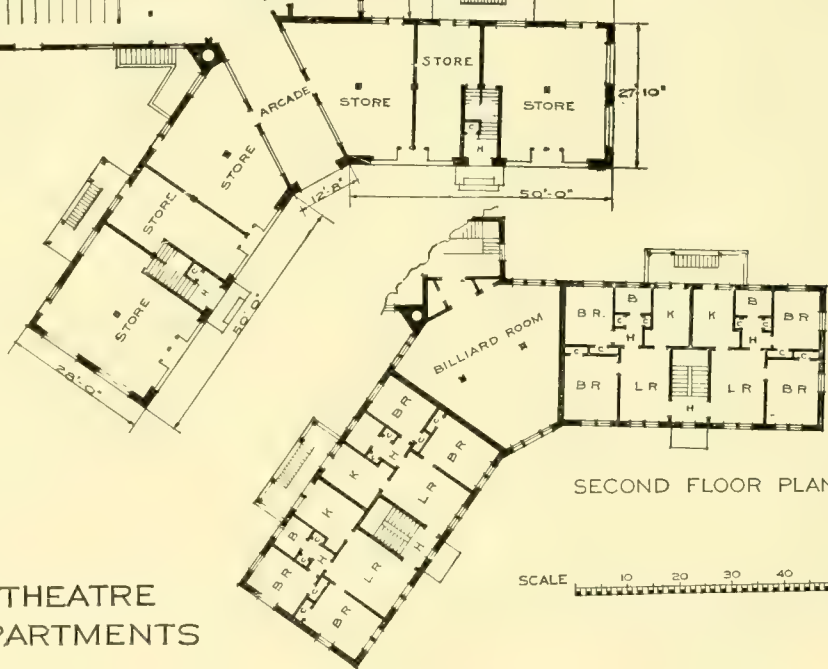
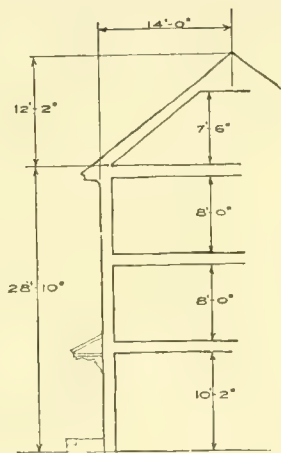
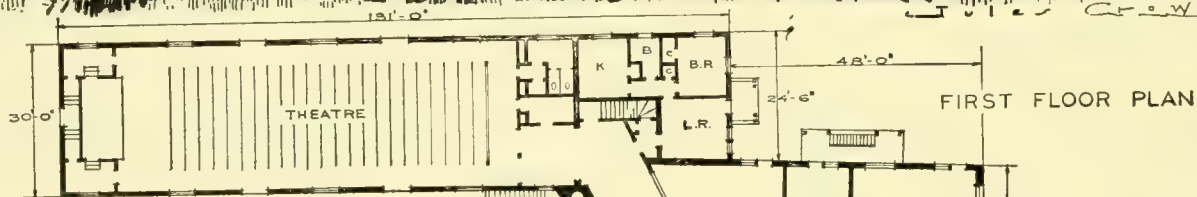
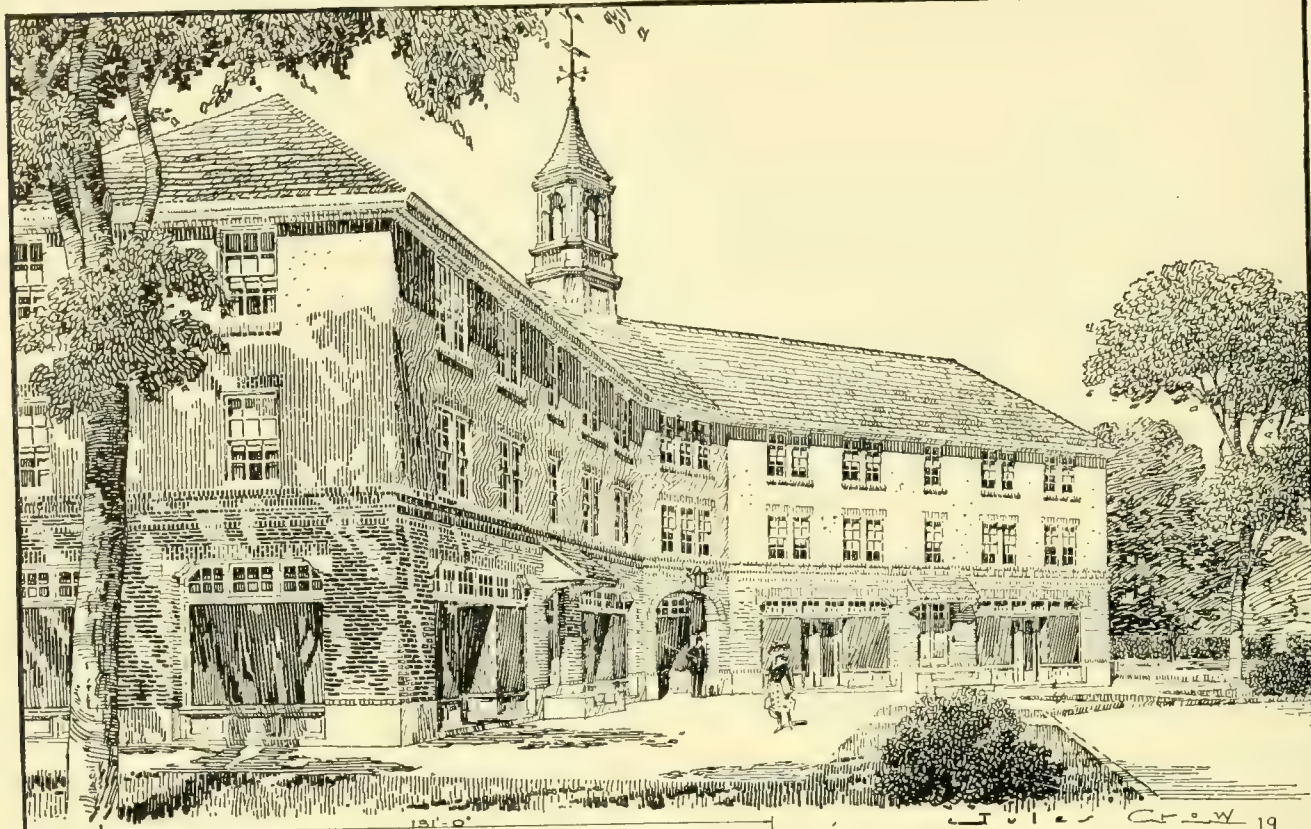
SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION

DEVELOPMENT AT NEW BRUNSWICK N J

ARCHITECTS

TROWBRIDGE AND LIVINGSTON



COMBINATION THEATRE
STORES AND APARTMENTS

SCALE 10 20 30 40 50 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NEW BRUNSWICK N J

ARCHITECTS TROWBRIDGE AND LIVINGSTON

NEW LONDON, CONN. (PROJECT NO. 157).

NEW LONDON SITE.—Area planned: 20.14 acres. Housing planned: Detached houses, 15 families; semidetached houses, 148 families. Total, 163 families. Housing constructed: Detached houses, 12 families; semidetached houses, 104 families. Total, 116 families.

GROTON SITE.—Area planned: 3.01 acres. Housing planned and constructed: Detached houses, 7 families; semidetached houses, 18 families. Total, 25 families.

(For further information see tables, Chap. IX.)

The harbor of New London at the mouth of the Thames is one of the best between Boston and New York, and has brought a number of naval industries to the city and to Groton, which is opposite on the east shore of the river. There is also a submarine base located two miles up the stream. New London had in 1910 a population of 20,557 while Groton had only 1,500 at that time. In 1918 the combined population had increased to about 45,000. New London had in 1918 a number of good-sized industries doing war work, but the largest were the two in Groton, the New London Ship & Engine Building Corporation, manufacturers of Diesel engines for submarines, employing 1,500 men and requiring the highest class mechanics, and the Groton Iron Works, 2 miles south, a shipbuilding corporation having Navy contracts and expecting to employ a maximum of 2,500 men.

A few of the workers lived in Groton, which had little in the way of public improvements except two primary schools, but except for those drawn from more distant towns, most of the workers came from New London, which has the facilities customary in cities of that size. There was a municipal ferry to Groton, but this had to be supplemented by ferries operated for the plants. The housing shortage was very acute and only a little relief was afforded through improved transportation by putting on a railroad train between New London and Saybrook.

Out of 16 housing sites examined and reported on, 2 were chosen, 1 in New London and 1 in Groton. The site in New London is designed to serve mostly high-class mechanics. It is in the western part of the city, west of Jefferson Avenue near Lincoln Street, a little less than a mile from the city hall and within half a mile to a mile of most of the industries to be served in New London. It is connected by trolley with the center of the city and the ferries to Groton. There are four schoolhouses within a half mile of the site. Churches, stores, playground, and amusements are accessible. All required utilities were near at hand.

Except for the lots fronting on Jefferson Avenue, which was already improved, the property is reached

by a single entrance street in continuation of Lincoln Avenue. Additional entrances, which under normal conditions would be expected opposite Pleasant and Fuller Streets, were omitted because the steep slope rising about 25 feet from Jefferson Avenue to the level of the rolling plateau would have involved cost and delay because of heavy grading in and near these streets. The extension of Lincoln Avenue was already partly graded; but even here in order to minimize the area of heavy grading the exceptionally steep gradient of 10½ per cent was permitted on the lower portion of the entering street. To offset these peculiarities of plan, the single entrance was made attractive by a central park strip and by a small oval at the top of the slope, whence the interior streets branch off. Moreover, direct access to the car line for the southerly part of the property was provided by a footway with steps on the axis of Pleasant Street without sacrifice of lots.

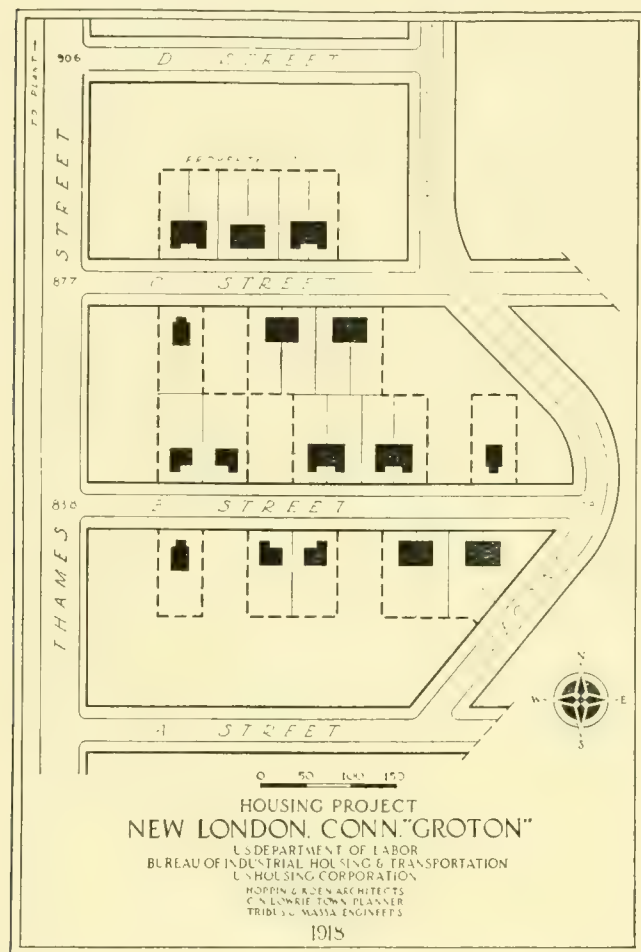
The streets are on straight lines but in no case are the straight runs over 500 feet in length, thus maintaining a good scale for the street vistas of a strictly residential district. The oval is the only park and the only special center of interest. Stores and recreation facilities already existed within half a mile, including a large unimproved public park.

Alleys are provided as a means of access to garage sites on the rear of certain lots not otherwise readily accessible on account of the steep slope of the ground.

Lots for semidetached houses are normally 25 to 30 feet wide, and for detached houses 40 to 50 feet wide, the side space between houses varying from 16 to 25 feet. The normal depth of lot is about 110 feet. Minor inequalities of surface required a considerable amount of cut and fill between the street lines and the rear lines of the houses; and in the rear of the Jefferson Avenue houses a heavy cut was necessary so as to give a level area 20 feet deep immediately behind the back doors, leaving the rear parts of the lots in their natural condition, 8 feet or more above the floor grade, available for gardens and garage sites. The difference in

level is taken up by a slope of about 1 on $1\frac{1}{4}$, planted with honeysuckle to avoid the problem of maintaining grass at such an angle.

The variations in the setback of the houses seem in execution, as at many projects, greater than necessary or even desirable, and do not sufficiently take into account the forms of the porches and house roofs, and the size of the porches. The sort



of quadrangle formed by the setting back of the three pairs of semidetached houses around the junction of West Pleasant Street and Colver Street is less effective in appearance than it might have been if the side spaces between the buildings had been minimized (instead of being greater than in the other portions of the project) and if the depth of the setback had been less in proportion to the length of the recessed portion. At least two more families could have been housed around this intersection with an improvement in the general appearance and without excessive crowding.

The grouping of houses around the oval is pleasant but would have been still more effective if the

houses, especially those next Lincoln Avenue and Colver Street, had been advanced nearer to the oval, reducing the spaces between the corners of the houses framing the oval and emphasizing the curve which they define. The houses opposite the ends of Marshall Street provide excellent formal vista points, but the large set-back of these houses as compared with their neighbors does not appreciably increase their value as vista points and when seen close at hand is decidedly too deep.

In the curtailment of the project after the signing of the armistice the construction of Marshall Street and the six houses facing on it was omitted, the space being treated as a temporary interior block playground for the neighborhood.

The development in Groton, only a quarter the size of that in New London, was made on streets already laid out. Little of special interest could be done in the general design. The houses are the same as some of those used at New London.

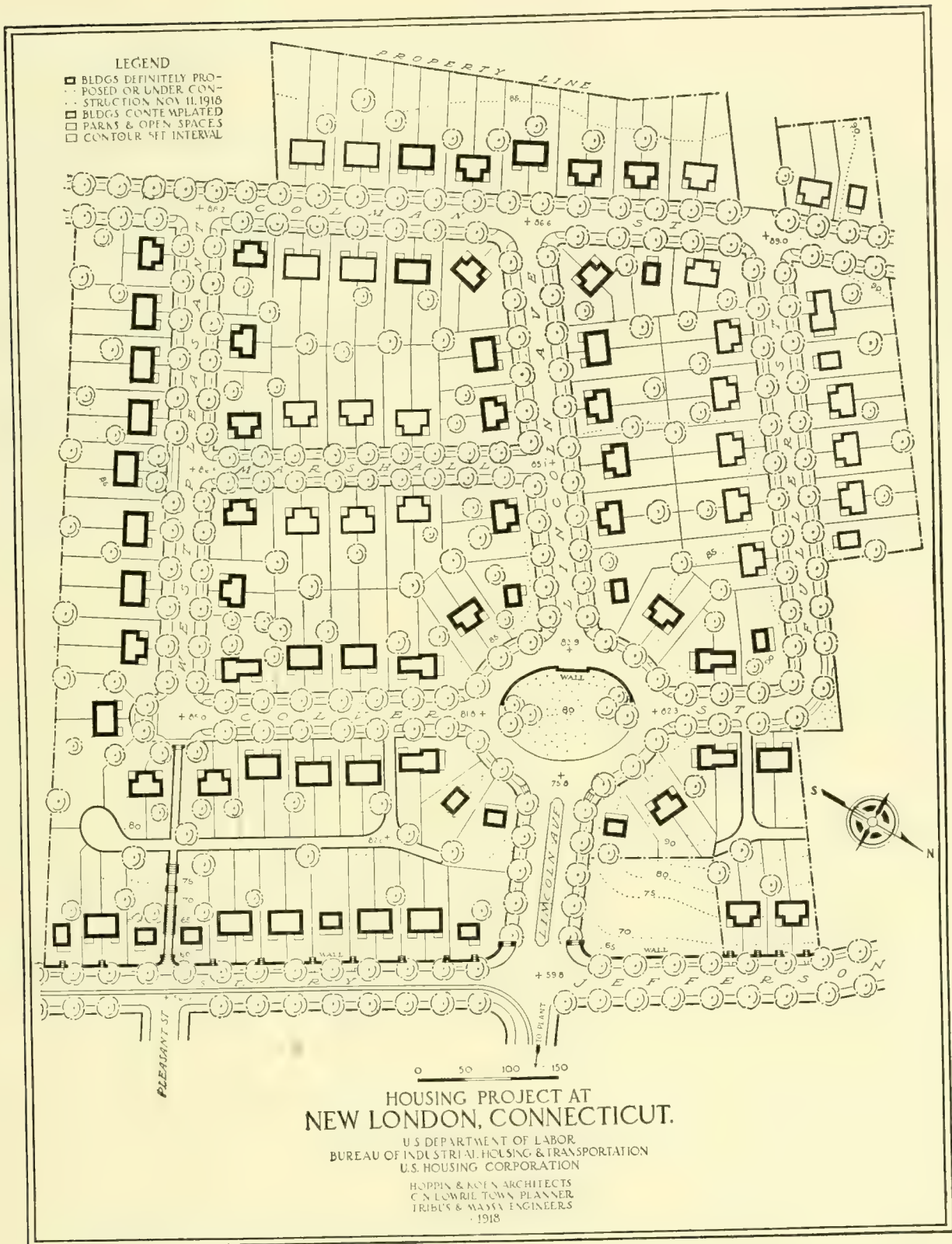
The houses of this project are extremely simple both in plan and exterior design, the plans having been exceedingly well worked out from the corporation standards. Ample space is given for all requirements, there being no sense of confined area. So, too, the exteriors are frankly designed, with no attempt to be more than the plans indicate.

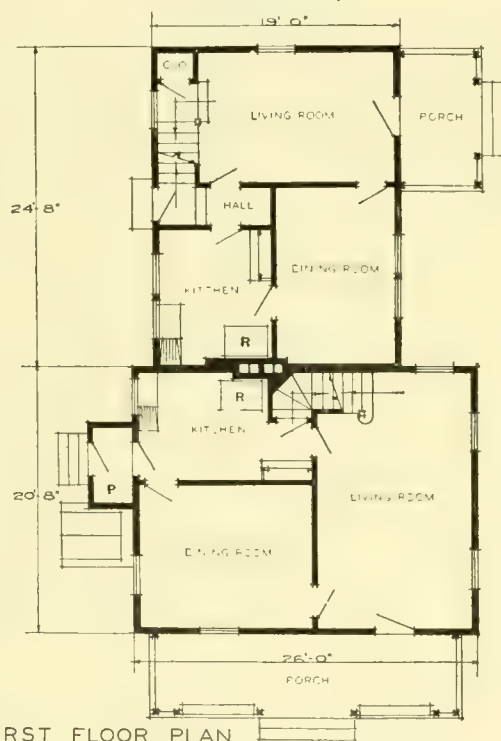
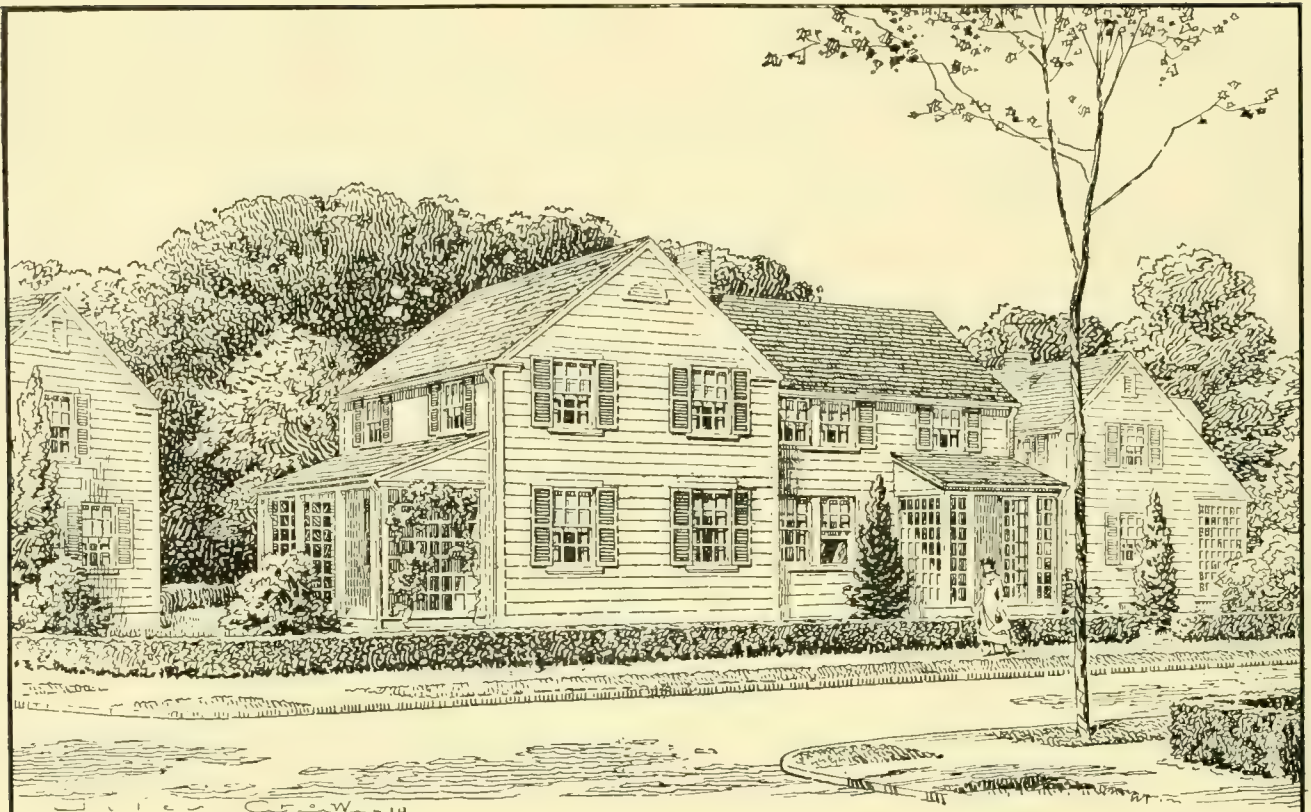
As is generally true, the pairs of semidetached houses are better in appearance than the detached house of the same plan, the "B-I-a" house (semidetached five-room) being particularly good. The A2 type (single six-room) which, on account of the roof coming down to the columns of the front porch, is given the effect of lowness which the other detached single six-room type house does not possess, is therefore the best of the single houses in appearance.

If there is any criticism of the design of the houses, it would apply to the sizes of the porches which, in most cases, might well have been made lower, with lattices smaller in scale; otherwise details are refined and of good character.

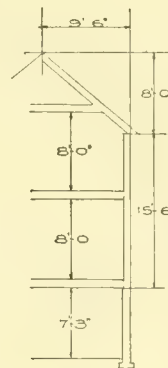
The carefully thought out use of color on these houses makes them particularly attractive. Some of them are white, while others are a very light gray or colonial yellow.

All the houses are clapboarded. They are well built and show few, if any, construction defects, in spite of the war conditions under which the work was started.

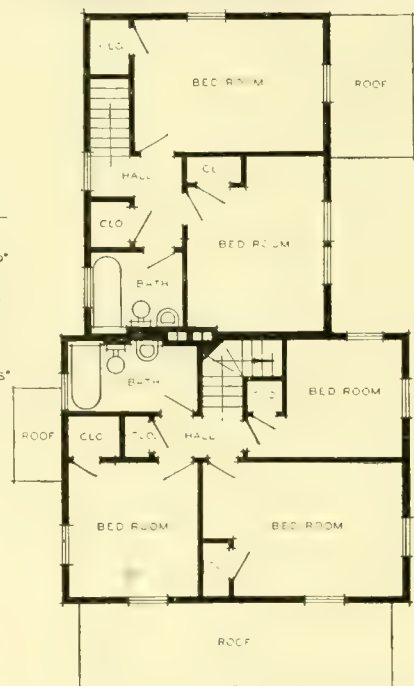




SCALE 5 10 15 20 25 FEET



SECTION



FIRST FLOOR PLAN

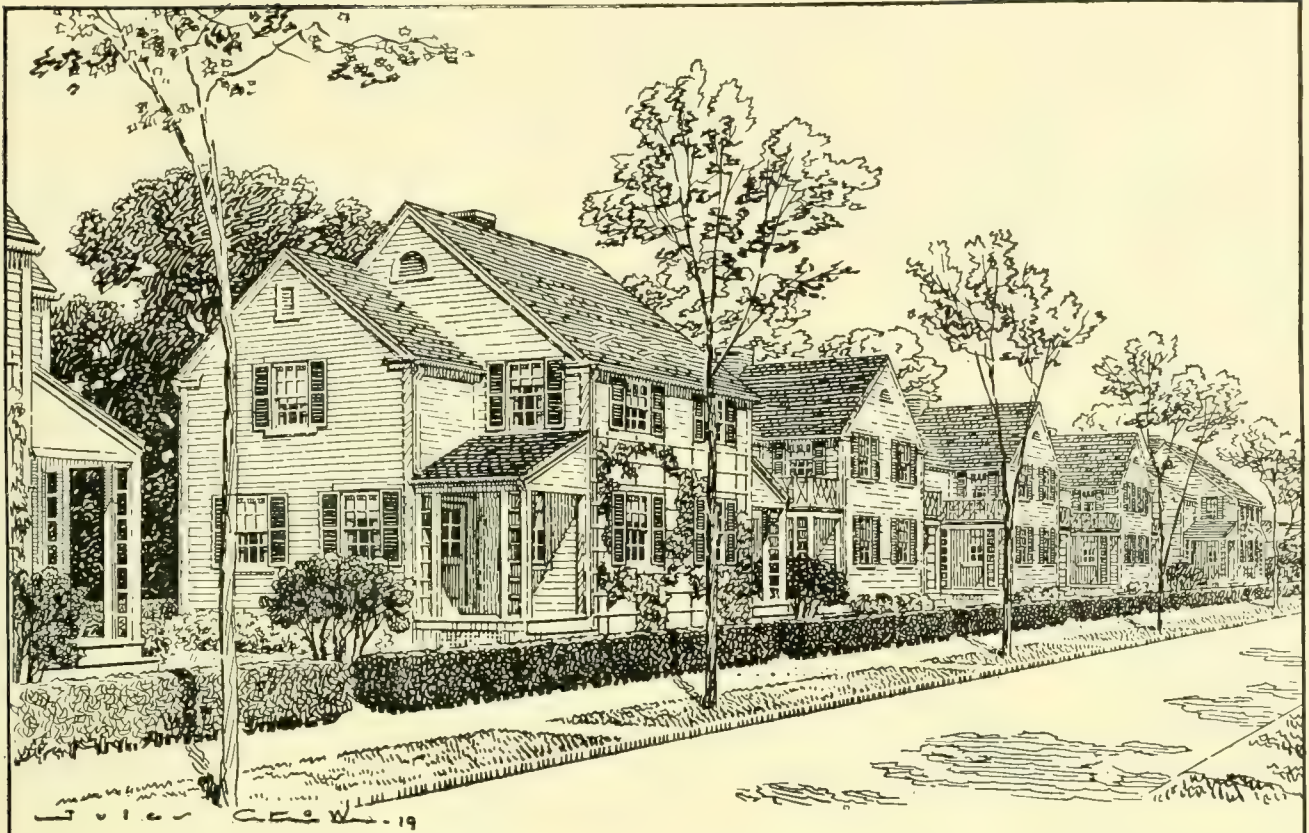
SECOND FLOOR PLAN

FIVE AND SIX ROOM SEMI-DETACHED HOUSES TYPES B 4

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NEW LONDON CONN

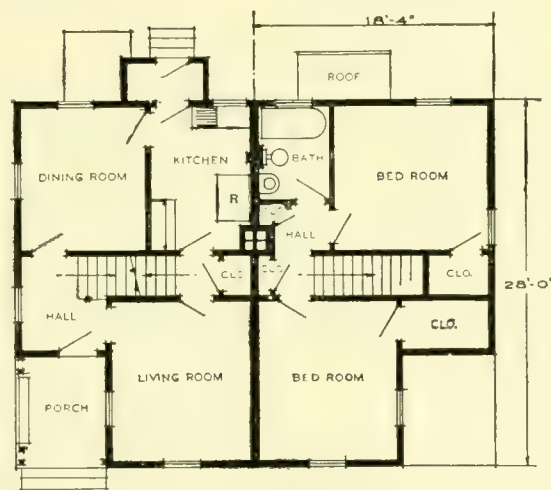
ARCHITECTS

HOPPIN AND KOEN



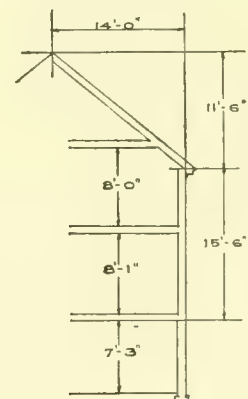
BIA

BIA REVERSE



FIRST FLOOR PLAN

SECOND FLOOR PLAN



SECTION

FIVE ROOM SEMI-DETACHED HOUSES TYPE BIA

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NEW LONDON CONN

ARCHITECTS HOPPIN AND KOEN

NEW ORLEANS, LA. (PROJECT NO. 722).

Area planned: 42.90 acres. Housing planned: Detached houses, 209 families.

(Project discontinued. For further information see tables, Chap. IX).

The New Orleans Naval Station is located across the Mississippi River from New Orleans, approximately 4 miles from the main business section of the city, but still within the city limits, in the suburb of Algiers.

The naval station employed a force of 1,700 men and was equipped to handle ship repair work and construction of small craft such as tugs, barges, and submarine patrol boats. It is the only repair station in the eighth naval district and with the progress of the war was rapidly expanding in the lines of work handled, so that in order to fulfill the demands upon it the labor force increased very rapidly, and it was essential to keep this force at high efficiency.

The transportation at this point is very poor owing to the fact that the only communication with the city of New Orleans is by ferry, and while quite a large number of extra ferry boats were put on they gave no material relief at the rush hours and had little effect on the housing situation. By ferry and street car it took many of the workmen an hour and a half to reach their homes. As a night shift was being worked at the naval station it was especially desirable that some of the better-paid men and superintendents at least should live near their work.

From the reports of the special investigators sent out by the Housing Corporation it was determined that there was an acute demand for housing at the station and that at least 100 workmen's houses should be built together with foremen's houses, cafeterias, and, possibly, a small business and recreation center.

The tract of land at first recommended for purchase for the village site was immediately west of the United States Naval Station, comprising approximately 15 city squares with two squares fronting on the Mississippi River, and extending to the south an average of 7 squares. The tract was bounded by Patterson, Hendee, and Newton Streets and Behrman Avenue, the long axis of the property running north and south.

The tract had no defined streets or roadways, and was flat and below extreme high water of the Mississippi River. But these features being

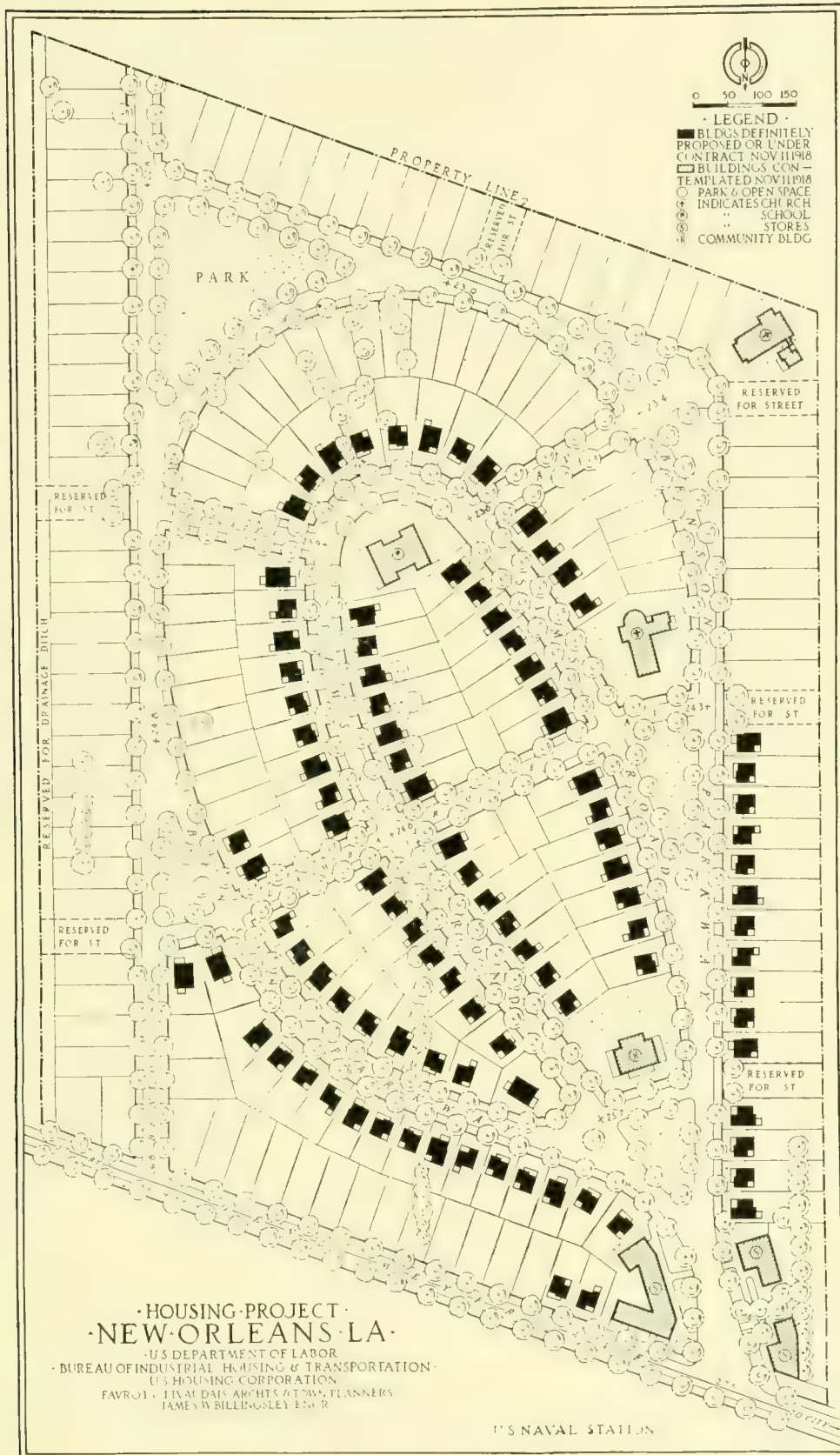
characteristic of the whole locality could not materially affect the choice of the site. It is to be borne in mind that all of this surrounding territory is a flat river bottom requiring artificial drainage, sewerage, and pumping of all water over the dike into the river. Convenience to the naval station and the river were the features in its favor. The total area of the plot was about 39 acres including streets. The value of this property was given in the assessor's office as \$91,260, but when the actual purchase was attempted the price asked was more than double this. On July 31, 1918, it was decided, pending further negotiations, to proceed at once with the field surveys and the formulation of plans.

A preliminary sketch being submitted by the designers and the work now having arrived at the point where the land must be purchased, negotiations were pushed to acquire it. The owners still held the price so much above what the officials of New Orleans and the Commercial Club, the Housing Corporation's appraisers, had estimated it, that the corporation refused to purchase. The site was abandoned and a second site on which options had been taken was recommended and approved. This site was south of the naval reservation and immediately adjoining it and about one-quarter of a mile farther east than the site first selected.

As far as the physical features of the second site are concerned, they were very nearly as favorable as those of the first site. The land could be bought very much cheaper, and the utilities would only cost a slight amount more, so the surveys and the designs proceeded for this site.

There were no topographic variations in the site sufficient to make one street layout better suited to the surface than another. There was a row of fine live-oak trees, scattered specimens, near the northwestern corner of the site. All the traffic from the site naturally sought the north, and mostly the northwest corner, this being the nearest way to town and to the naval station.

The design of streets was therefore based on an entrance at the northwest corner, with stores on each side, community building facing down the short entrance road, and a simple curvilinear development, self-contained but not interrupting the



future street system of the neighborhood. Sites were set aside for a school and for churches, where they would be both convenient and effective in the general composition.

The houses were the same type of bungalows planned for Charleston, S. C., and Pensacola, Fla.

In this particular locality the utilities service is of such a peculiar nature owing to the tracts being below the level of the dikes and high water in the Mississippi River, that it became practically a necessity to derive a greater part of the utilities from the city of New Orleans. The Housing Corporation took the question up with the water and sewer boards of New Orleans and other officials and secured a promise from them to construct the water and sewer mains and drainage ditches and to assist in constructing the roadways and to bear about two-thirds of the expense.

Water supply was to be secured from the city of New Orleans by the extension of a 20-inch main into the project, the large size of this main being due to the fact that the city would eventually have

to extend into this territory and they wished the pipe to be of sufficient size to take care of the locality when fully developed. As they were bearing such a large portion of the expense, it was a desirable proposition from the point of view of the Housing Corporation.

As this tract of land is flat and the rainfall is very heavy, it was necessary to provide for carrying off the storm water as far as possible over the surface or through open ditches. A small proportion of pipe drains were planned, especially through the principal community centers. Sanitary sewerage was provided by extension of the city mains into the project.

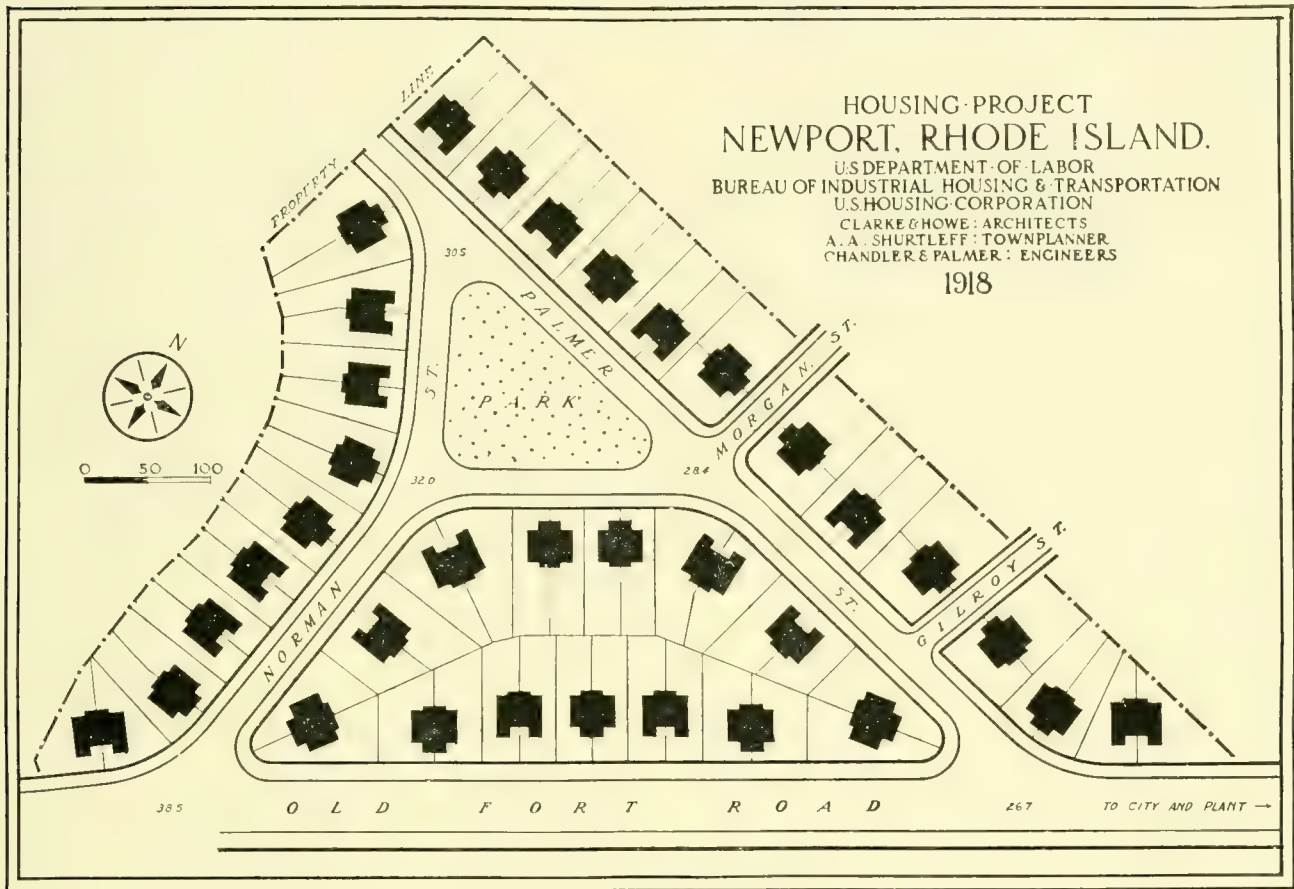
The project was still in the design stage when the end of the war came. It had been delayed to a very considerable extent by the serious complications that had arisen in regard to the purchase of real estate. If it had not been for these delays, it is probable that the project would have been advanced so far that the Housing Corporation would have completed it.



NEWPORT, R. I. (PROJECT NO. 382).

NEWPORT SITE.—Area planned: 7 acres. Housing planned: Semidetached houses, 68 families. Housing constructed: Semidetached houses, 48 families.
JAMESTOWN SITE.—Area planned: 2.38 acres. Housing planned: Detached houses, 10 families.

(For further information see tables, Chap. IX.)



Newport lies on the southern end of the island of Rhode Island, near the easterly shore of Narragansett Bay. It is one of the old towns of New England, and the town center still retains much of its old-time appearance. The city has a permanent population of about 33,000, which is increased by the summer residents to about 40,000. The United States torpedo station on Goat Island, at the mouth of the harbor, is the oldest and largest torpedo manufacturing plant in the United States. It also assembles and distributes the torpedoes manufactured elsewhere in the country and repairs and rebuilds those used in practice, and manufactures mine mechanisms and gun primers.

Two thousand seven hundred men, mostly highly skilled mechanics, were employed early in 1918 on the torpedoes, and from 1,000 to 2,000 more men would soon be needed. Three hundred and forty

women were employed temporarily on the primers. More work was expected in the future after the war than was going on at this time. Most of the men lived in Newport, 100 in Jamestown, and the balance in surrounding towns. It was impossible to get skilled mechanics in Newport, as there were almost no other industries. There were no houses obtainable, and workmen, therefore, refused to come from other towns, or would not stay when they had been induced to come.

Two housing sites were chosen for the benefit of the employees of the United States torpedo station. The larger was in the city of Newport, as Goat Island is only five minutes away from Newport by a ferry in constant operation. The other was to be at Jamestown, on Conanicut Island, 25 minutes away by a ferry which was likely to be irregular in winter because of ice. Jamestown, too, had neither

parks, playgrounds nor amusements and only one grammar school, while the site selected in Newport had park, playground, amusements, and shops half a mile away. The Newport site is near the corner of Old Fort Road and Bateman Avenue, a block from a car line which leads directly to the Government landing on Thames Street and the ferry to the torpedo station. Drainage of the site is easy, the slope gradual, and sewer, water, and electric mains are in adjoining streets.

The arrangement of the interior streets is the obvious and probably the best method of subdividing the given triangular plot. The small triangular interior park may seem to be a waste of space in this regard, and the scheme calls for more than the minimum in road construction, but it was impracticable to produce more good lots by any street arrangements which threw the park area into lots, and it seemed that it would add more to the total value of the development to raise the value of about 24 lots by fronting them on a park than to attempt to add to the value of about the same number of lots by making them deeper when they were already deep enough.

The climate of Newport being especially suitable for the growth of privet, the lots were separated and the streets bounded by privet hedges in accordance with rather general local custom in the newer parts of the city. This would have been unduly monotonous in a larger development, but served to give this small scheme a pleasant unity.

The symmetrical groupings of seven pairs of houses on Old Fort Road from Norman to Palmer Streets and of four pairs of houses on Norman Street between the park and Old Fort Road are agreeable, and it is interesting to note that although the interior houses of these groups are set back of the end houses as much as at some other projects where the setback seems excessive, the form of their roof lines, sweeping down to the front of the porches from the main ridge, in contrast to the strong vertical corners of the end houses, makes their setback seem much less. The turning of the four pairs of semidetached houses at the corners of Morgan Street and Gilroy Street to face on those streets, instead of on Palmer Street, although it gave much better side yards, was injudicious. The houses would be worth more facing toward the rest

of the development and the park, and they stand, as placed, at a slight but unpleasant angle with the general line of Palmer Street.

The general appearance of the project is decidedly good, and the fact that there is no variation from the use of semidetached houses, nearly uniform size, shape, and architectural treatment does not in fact produce any unpleasant feeling of monotony.

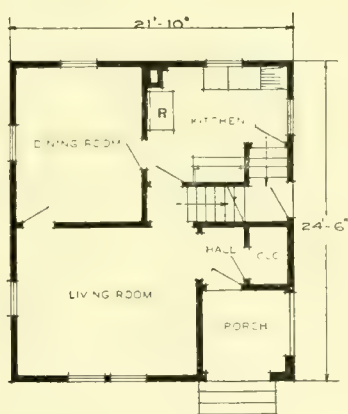
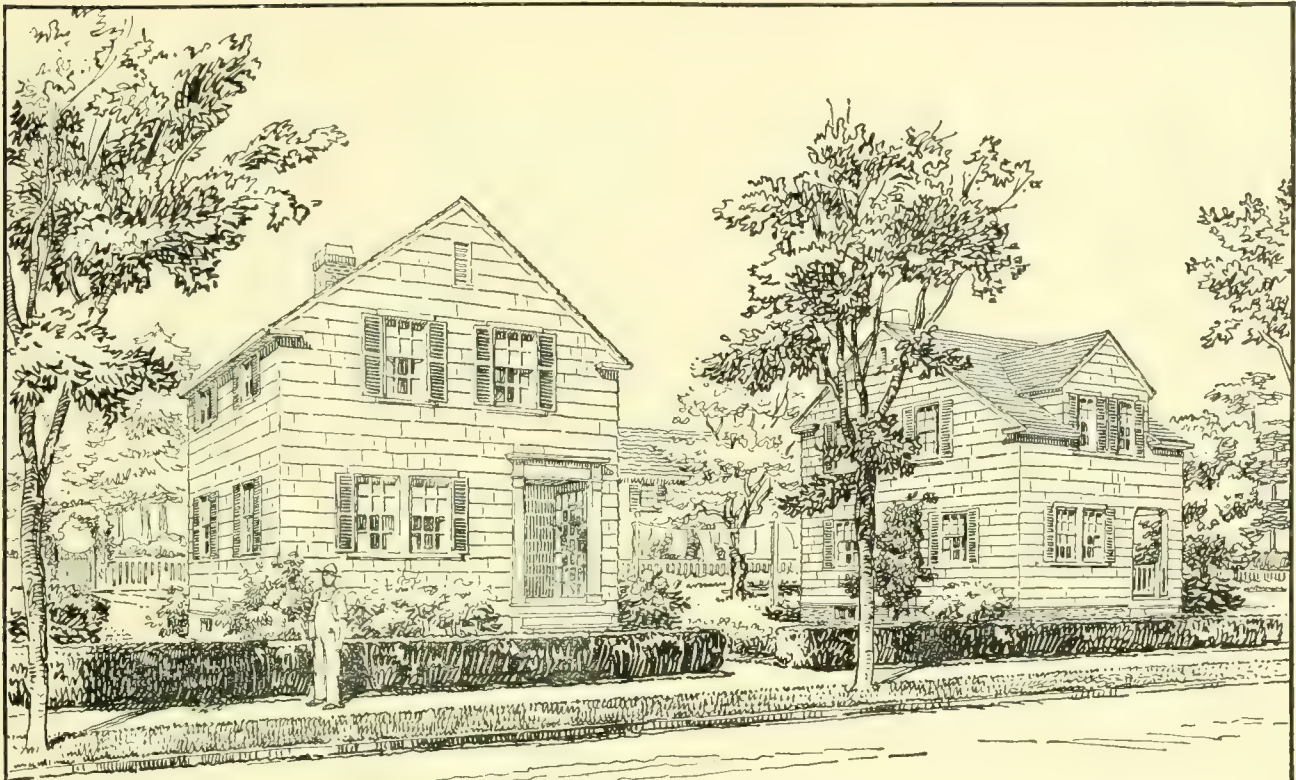
But three types of plan have been built at the Newport project; viz: One 5-room and two 6-room types. One of the 5 and one of the 6-room types has been used singly and semidetached, while the other type of 6-room house has been used only detached and has two different exterior designs. They are all of shingle with slate roofs, thus presenting a uniform appearance, so far as color is concerned. The general character of the designs taken as a whole is in harmony with the old houses which abound in and near the city and the refined details of porches and other millwork contributes much to the appearance of the development.

The best house is the A-1, a semidetached house with six rooms for each family. Particularly good are the pitches of the roof as shown by the gambrel ends, though from the front the long stretch of wall in the second story does not help the design. But aside from this feature (a necessary one for the plan) the house is conspicuously good.

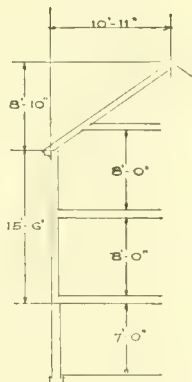
The A-2 and B-2 houses have the same refinement of detail as the others, but the roof lines are not so good as in A-1. The small gable of A-2 detracts from the appearance of the house and the manner of introducing dormers in the B-2 house is not especially good. The B-1 house is attractive in design.

The projection of the eaves and cornices throughout adds much to the appearance of all the houses, and the building in of the wood gutters is a distinct improvement over those houses where they have been hung as though they were hanging gutters of metal.

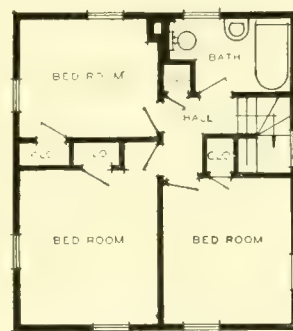
The plans have been well worked out. The houses have been built well out of ground, thus giving abundant light in the cellars, where the laundry tubs have been placed, without making the houses appear too stilted. The kitchens are abundantly lighted, having windows entirely across one end.



FIRST FLOOR PLAN



SECTION



SECOND FLOOR PLAN

SIX ROOM HOUSE TYPE C 1

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NEWPORT R 1

ARCHITECTS CLARKE AND HOWE



SIDE ELEVATION

B1

SCALE 5 10 15 20 25 FEET

SIDE ELEVATION

A1



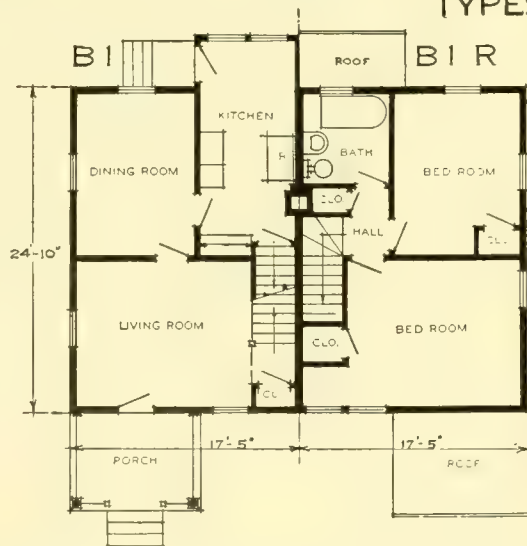
FRONT ELEVATION

FOUR AND FIVE ROOM SEMI-DETACHED HOUSES

FRONT ELEVATION

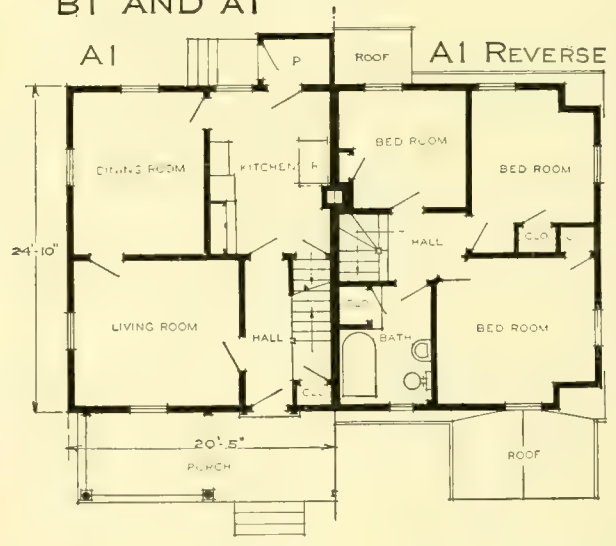
TYPES

B1 AND A1



FIRST FLOOR PLAN

SECOND FLOOR PLAN



FIRST FLOOR PLAN

SECOND FLOOR PLAN

UNITED STATES HOUSING CORPORATION

DEVELOPMENT AT NEWPORT R I

ARCHITECTS

CLARKE AND HOWE

NEWPORT NEWS, VA.

The city of Newport News had grown, up to the beginning of the war, coincidently with the growth of the Newport News Shipbuilding & Dry Dock Co. With the entrance of the United States into the war, however, the advantageous position of Newport News as a port brought a sudden and enormous increase of activity, as it did to Norfolk and Portsmouth across the bay.

The Army built an embarkation camp, an aviation camp, great storage and shipment yards for supplies, storehouses, and yards for horses and mules to be shipped overseas. The Navy and the United States Shipping Board placed large orders with the Newport News Shipbuilding Co., which was greatly extending its facilities. The demand for labor for all these activities was very great, and the different Government activities found themselves bidding against each other for men. The existing facilities of the town such as water supply and sewers, and all provisions for amusements as well as housing, were completely outrun by the influx of population, until presently the living conditions became so intolerable that practically no inducements would bring in each week more men than went away. The better men sought less abominable living conditions elsewhere, and there were toward the last a large number of men who had never been much better than loafers, drawn in from all over the country, and further demoralized by high pay and irregular living, who floated from job to job and did very little work anywhere.

The Shipbuilding Co. had built a few houses and apartments for their employees; the Shipping Board was building some apartments and had under way the town of Hilton, of about 500 houses, 3 miles up the James River from Newport News, for higher-paid employees of the shipyards.

The Housing Corporation, being called in at this point, planned four developments to relieve four different phases of the situation: An extension of the Shipping Board's project of Hilton for higher-paid workmen; Briarfield, for colored workers (a large development near the shipyards); a number of row houses on Virginia Avenue; and a group of dormitories almost adjacent to the shipyards, with cafeteria and clubhouse for single men workers.

The signing of the armistice stopped work on these projects just as construction was about to

begin. There is still a need for housing at Newport News, but it must now be done by some other agency than the Housing Corporation as at present authorized.

Hilton Extension (Project No. 57a).

Area planned: 78.32 acres. Housing planned: Detached houses, 158 families; semidetached houses, 146 families; row houses, 161 families. Total 465 families.

(Project discontinued. For further information see tables, Chap. IX.)

The land on which Hilton is built and on which Hilton Extension was planned lies on the James River 3 miles north of Newport News. The site of Hilton Extension was partly open farm land along the river. The rest of the area was covered with a thick mixed growth of trees, largely pines. The soil is clay underlaid with sand. The surface of the ground is about 26 feet above the James River, and, curiously enough, after rising from the river in a steep bank, slopes for the most part very gently away from the river, draining naturally, as far as it drains at all, into the swamp land to the east except as this condition is reversed by several surface ditches leading to the James. One ditch is on the north boundary of Hilton. This discharges into a small brook which flows through Hilton into the James, cutting through the high bank of the river. This brook has two branches, north and south, the north branch running more or less parallel to the river and 500 feet from it, from the property of the Housing Corporation into that of the Shipping Board. Into this brook the surface drainage of all the site of Camp Morrison had been discharged by a large ditch, which ran for part of its course at right angles to the river along the north boundary of Hilton Extension as here shown. It was planned to continue this ditch directly into the river instead of discharging it into the brook, thus abolishing the brook within Hilton Extension.

A railroad station was already arranged for at Hilton, and the electric railroad was extended along Warwick County Road to Hilton and later with our aid through the extension. The awkward curves of Warwick County Road, as shown on plan, quite unnecessary in a flat topography, were already fixed.

It was evident that Hilton Extension and Hilton should cooperate in water supply and sewerage.

There was a complete sewerage system under construction for Hilton, with a septic tank discharging its effluent into the river. This would have to be much enlarged, however, if it were to accommodate twice the population of Hilton, as planned, and both projects would naturally share this expense. The water situation was very bad throughout Newport News, both on account of inadequate present storage capacity and inadequate main pipe lines as well as service lines. The Army was installing another main parallel to the one which ran by both developments, but no arrangement satisfactory to all consumers could be reached except by the Government's undertaking some broad solution of the water problem of the whole congested region. This was under way when the armistice was signed.

The street plan of Hilton Extension was closely related to the plan of Hilton, indeed a part of the site near the railroad along and south of Post Street, which was first planned by the Shipping Board, was turned over for construction to the Housing Corporation. River Road, planned as a pleasure drive, where it runs through Hilton, was continued for the same traffic through Hilton Extension, the purpose being to make eventually a shore drive which would, at least for some distance, remove the pleasure traffic from the general and commercial traffic of Warwick County Road. The minor streets parallel to the river, instead of some of them being developed with little neighborhood parks, as in Hilton, were given variety by a slight deviation from a straight line, which came about naturally in any case from the shape of the site.

At right angles to the river, midway of the long blocks between James Street and Post Street, we planned a shaded path, crossing Warwick County Road where the cars were to stop, and running from the school site to the park, making a pleasant direct way by which people could walk from their homes to the electric cars or toward the railroad station. Where this path crossed the various roads little open spaces were made with the houses set back around them. The angle in the roads at these open spaces tended to make the spaces seem more complete and inclosed.

Additional sites for churches were provided. The stores of Hilton were to serve both developments. The school facilities were to be divided, Hilton to accommodate the higher grades, in the school and community house at the end of its central avenue, and Hilton Extension to provide for most of the lower grades.

The density of population of Hilton Extension was to be somewhat greater than that of Hilton to reduce expense per house. This produced a greater per cent of row houses, which were located on the more accessible but otherwise less desirable land between Warwick County Road and the railroad. The architectural effect was planned to be similar to that of Hilton, but simpler with fewer types of houses, and on account of the row houses, more of the larger building masses.

On both developments the most desirable land, that along the river bank, except that used as a park, was set aside in larger lots for purchase by such people as could afford the greater cost.



Block Ends.

Area planned: 10.69 acres. Housing planned: Row houses, 253 families.

(Project discontinued. For further information see tables, Chap. IX.)

Thirteen ends of blocks were acquired on which row houses were to be built fronting on the west side of Virginia Avenue. Certain of these houses in each row were to be occupied by a family providing meals for the workers living in the row. Some of the workers were to room with families, and some were to occupy small apartments or single rooms.

Dormitory Site (Project No. 57b).

Area planned: 7.41 acres. Housing planned: 1,092 persons in dormitories.

(Project discontinued. For further information see tables, Chap. IX.)

For rapid construction and maximum service to the shipyards the group of dormitories was planned west of Virginia Avenue, near the shipyards. Direct railroad service to the storage and kitchen of the cafeteria was easily provided. The cafeteria, too, was near enough to the shipyards to be available during the lunch hour.

Briarfield, Va. (Project No. 57c).

Area planned: 96.03 acres. Housing planned: Detached houses, 150 families; semidetached houses, 164 families; row houses, 236 families. Total, 550 families.

(Project discontinued. For further information see tables, Chap. IX.)

The Briarfield site was chosen for housing the colored workers because it was cheap enough for its purpose and was the nearest land available to the shipyards, lying in the line of expansion of an existing Negro neighborhood.

Its disadvantages are that the maximum difference in elevation, between northwest and southeast corners, is only about 15 inches; the water level in the soil is high, and the land lies 18 feet lower than the crest of the shore at the shipyards. It was also necessary to eliminate the grade-crossing of Briarfield Road across the railroad yards. However, the railroad was pledged to bear all or most of this expense.

These houses were not designed for the lowest paid of the Negroes. It was expected that Briarfield would become the most popular Negro neighborhood, attracting the most prosperous and desirable families, whether or not already housed, but none the less relieving the general shortage of housing, through a general shifting of population.

To produce a house and lot, having proper conveniences, which would be within the means of the colored workmen there were two alternatives. We could build a very cheap shell for a house, having only the most essential conveniences, but with a lot large enough for a considerable garden, or we could build row houses, each dwelling well constructed and well provided with all utilities but set on a lot of minimum size. The first of these alternatives would make it necessary to some extent to scatter the development, placing the houses farther from the shipyards, and this type of dwelling would appeal to only a few of the shipyard workers. Most of them had neither leisure nor desire to care for a large plot of ground in addition to doing their work in the shipyards. The second alternative, the row-house, as a dwelling for colored people in southern cities is generally looked on as undesirable. It is—as usually built—unsanitary and dark, and the whole row of dwellings is usually the property of some one white owner, living elsewhere and getting the maximum of rent for the minimum expense of upkeep. The row houses as designed for this project, however, were conveniently planned, with no dark rooms, and modern in all appointments.

We were convinced that these dwellings could readily be rented to the colored laborers. We believed that, either through the well to do members of the colored population or through the management of the shipyards, owners could be found for these rows of houses who would keep them in proper condition and foster a general pride in the appearance of the community.

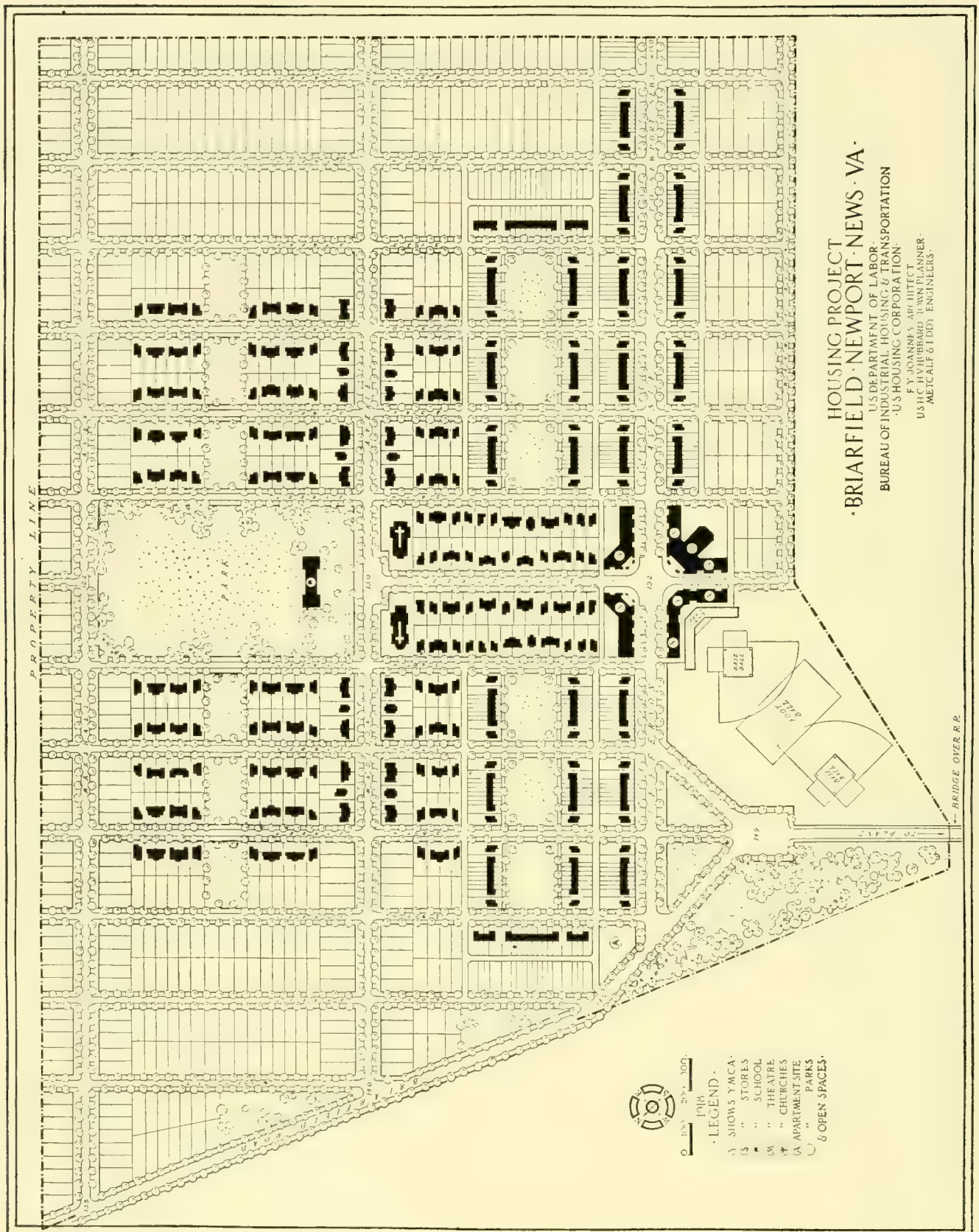
Some of these row houses were to face on a neighborhood park without roadways, being served in the rear by an alley, but in front only by the walk bounding the turfed area. When the alley serves two rows of houses this rather unusual scheme is not particularly uneconomical, but there is a waste of alley construction where the type of development changes to the more normal arrangement at that point, for the alley is necessary on one side only. The use of a similar neighborhood park in the area devoted to detached and semidetached houses in Briarfield, as shown on this plan, is open to the objection of increasing the cost of roads and utilities by using available street frontage on open space. Usually it would be better to concentrate this open space where it entails less utility expense and occupies

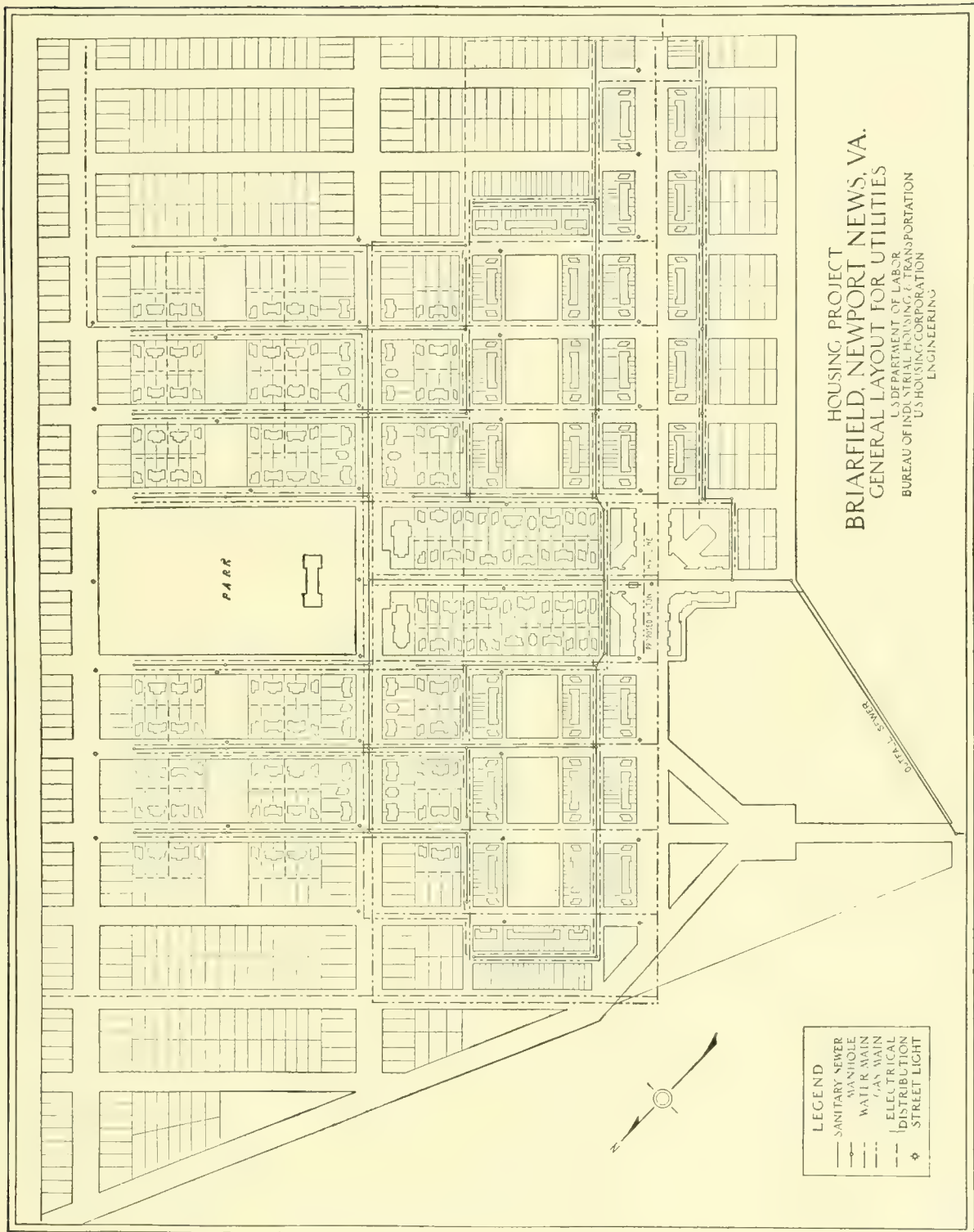
land of less value as building lots. These six little open spaces were shown for the purpose of discussion, but house lots might have been substituted for them if the plan had come to the stage of final discussion before construction. It is to be noted that in spite of the varied house arrangements and the number of open spaces, the gridiron street system remains an element of monotony. A more pleasant appearance could have been attained with less apparent effort and no more expense, if it had seemed proper under the circumstances to fit the streets to local traffic lines and to the disposition and shape of areas for local needs, rather than to the accepted standard city street layout.

The arrangement of the buildings on Fifty-fifth Street, between the square and the school, is probably too varied. We believe that it would have been better to make these houses more uniform, thus concentrating attention on the objects of interest terminating the vista at each end of the street.

It was planned to carry the water in grass gutters or open ditches beside the roads as far as possible, to save expense and to minimize gradient, keeping the whole storm water system higher. This would not have been desirable if any large number of the lots were to have private garages.







NIAGARA FALLS, N. Y. (PROJECT NO. 404).

Site A.—Area planned: 23.08 acres. Housing planned: Detached houses, 45 families; semidetached houses, 56 families; row houses, 32 families; total, 133 families. (Project discontinued.)

Site B.—Area planned: 21.75 acres. Housing planned: Detached houses, 4 families; semidetached houses, 46 families; row houses, 150 families; total, 200 families. Housing constructed: Semidetached houses, 46 families; row houses, 150 families; total, 196 families.

Site C.—Area planned: 8.40 acres. Housing planned: Semidetached houses, 20 families; row houses, 48 families; total, 68 families. (Project discontinued.)

(For further information see tables, Chap. IX.)

With the application of water power to the production of electricity, the city of Niagara Falls, to which tourists had been coming for generations for the beauty and wonder of the Falls, became also the greatest center of hydroelectric power in America and a thriving manufacturing town with industries depending upon electrical energy. The products of Niagara Falls were varied, but most of them were found to be valuable for war purposes. Those establishments producing nonessentials were closed. Ninety-five per cent of the ferrosilicon and ferromolybdenum, essential to the manufacture of guns, was produced here.

In 1918 the city had a population of between 50,000 and 60,000. It had been growing very rapidly, and with every increase in the industries and corresponding influx of workmen the housing facilities had been getting more and more inadequate. It was estimated in 1918 that there was need for more than 2,000 additional houses. The higher paid men were largely American born, but fully two-thirds of the workmen were foreign born, including Italians, Poles, and Slovaks. They lived for the most part in districts according to their nationality. Although they were willing to tolerate worse surroundings than the American-born workmen would do, their living conditions were fast becoming impossible. In a Polish district from two to five families were found occupying houses built for one family.

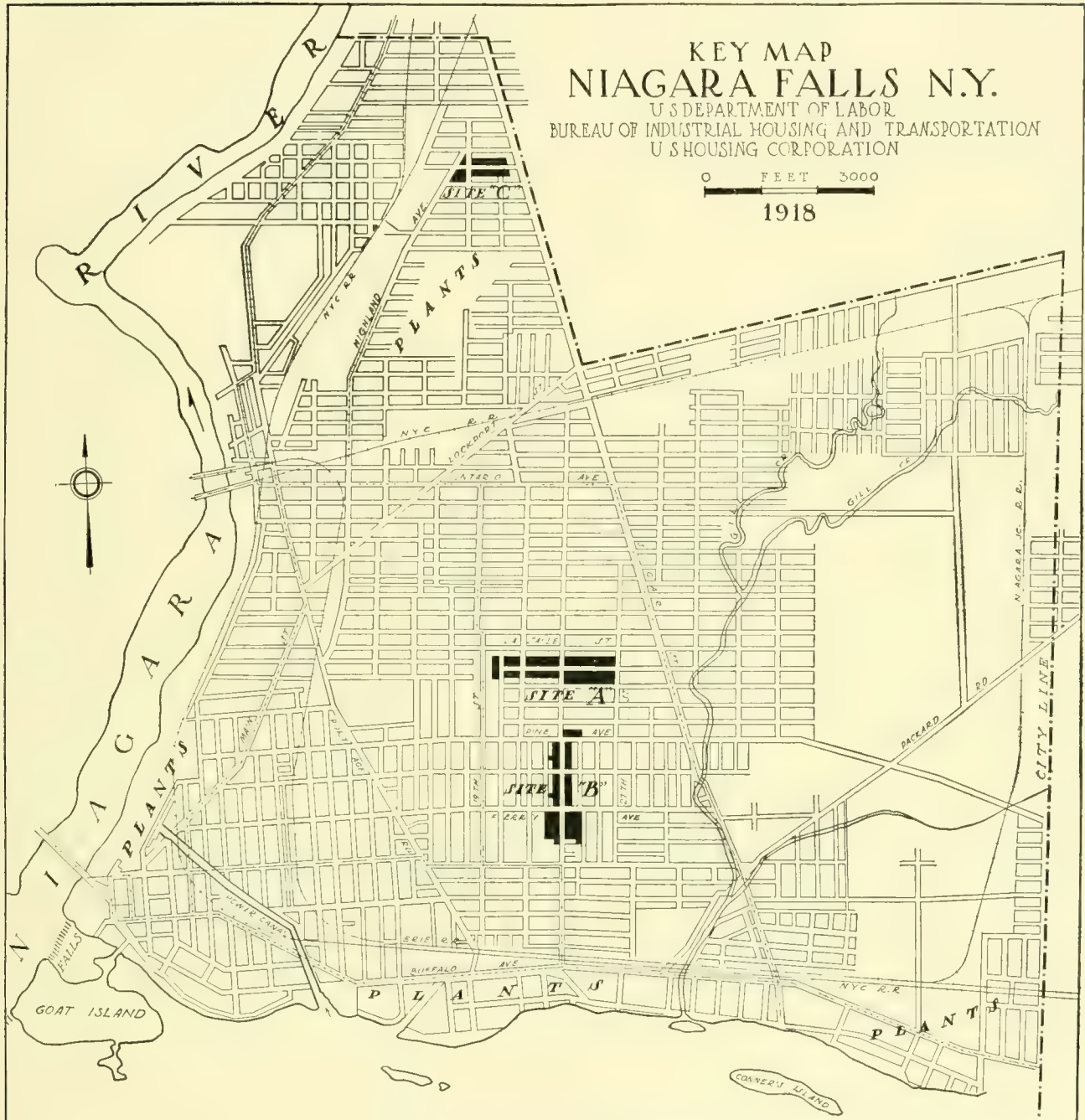
In general there are four industrial centers in Niagara Falls. One, known as the upper district, is above the Falls in the southeastern part of the city, the middle district is above the Falls in the southern part, the milling district below the Falls in the west, and the lower district in the north.

Because of this distribution of the industries it was decided to construct three developments, two of which should serve the middle and upper districts and one the lower district. In locating these sites it was necessary to take into account that some of the industries making chemicals give off poisonous fumes, killing vegetation, and injurious, or at any

rate unpleasant, to human beings. This made residence undesirable near these industries in the path of the prevailing winds, which were from the southwest, thus ruling out some otherwise possible sites. The lower district was chiefly in need of housing for common labor, and the north site (site C) was planned on this basis. Of the other sites, near each other, one was for the higher class of American-born skilled labor and foremen (site A). The other was for the better class of common labor, one end being adjacent to the present Italian quarter and the other adjacent to the Polish quarter (site B). Some objection was raised to this segregation of races as being un-American, but the fact remained that the workers desired it and the Housing Corporation therefore felt that it was better not to go counter to this desire, as far as our immediate purposes were concerned. Further, it was an open question whether the amalgamation of the various kinds of Americans could be forced, or whether it could not better take place by more gradual intermingling on individual initiative.

In all three sites the environment is residential, of medium verging into low class. Site A is just within a mile of the industries to be benefited, site B somewhat nearer, site C within half a mile of the works in the northern district. All three sites are upon accepted or projected streets the lines of which could not be materially changed. They were all within the city limits, and utilities were already planned by the city, so the sites readily could become parts of the existing system. The topography, being flat and uninteresting, offered no engineering difficulties. Site A is very near a new public school and playground, and is also convenient to stores, movies, and the like. Site B is a trifle farther from schools, and the intensive development proposed necessitated provision for local stores. After the armistice sites A and C were abandoned and site B alone completed.

On site B the attempt was made to produce houses which should be rentable almost as cheaply as the typical two-flat tenement, but which should



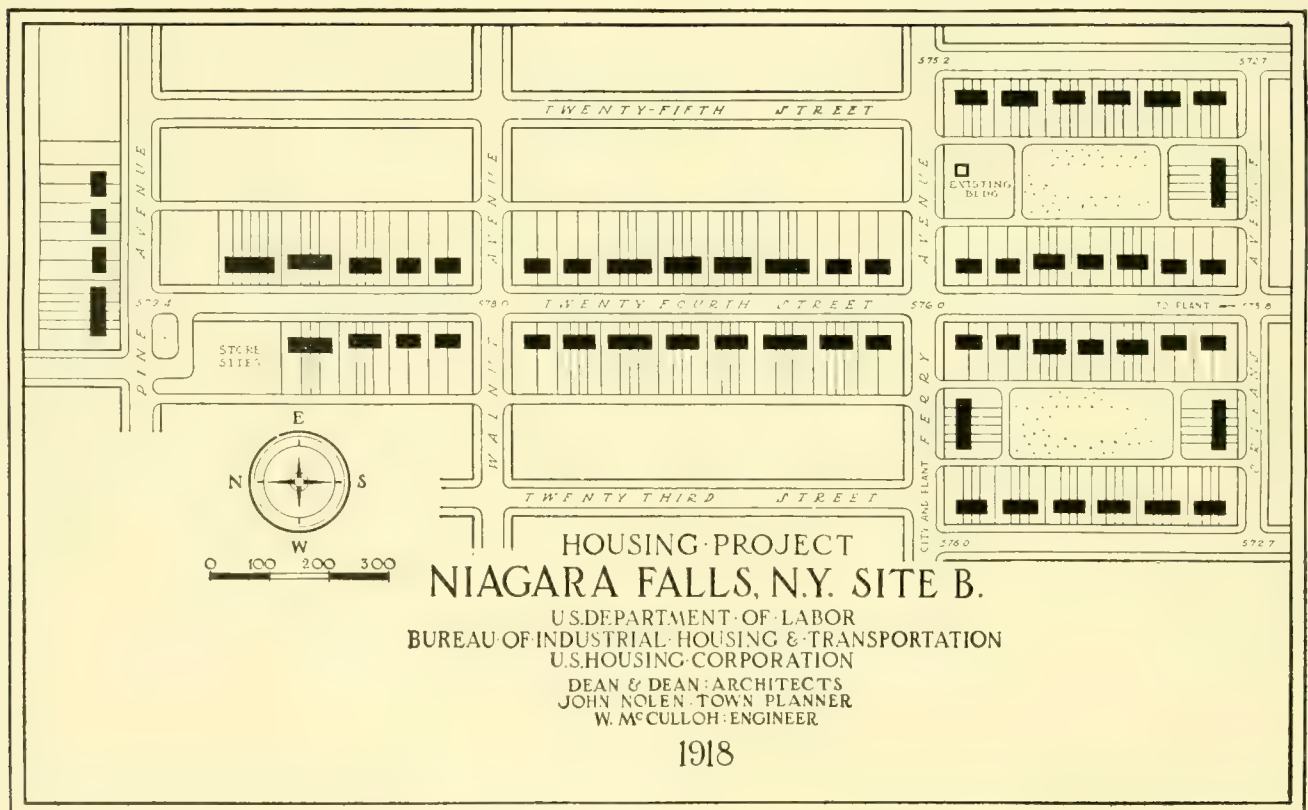
offer considerably greater advantages in air, light, and appearance. The houses were arranged in simple lines along the streets, a recessed setback between Orleans and Ferry Avenues and a setback of opposite row houses between Walnut and Pine Avenues being the only variations. In the latter case the length of the recessed portion is too short in relation to the depth of the setback. The large six-house row on Pine Avenue at the head of Twenty-fourth Street, with its strongly marked central gable, is unfortunately off axis of Twenty-fourth Street, just failing to give a satisfactory vista point. With the size of building units adopted this could have been avoided only by sacrificing a lot. To use to best advantage the deep blocks on each side of Twenty-fourth Street between Orleans and Ferry Avenues, we introduced allotment gardens, believing that at least this amount of land would be so used by some of the people housed in the development, or would later be useful as a block playground.

There were on the site a number of houses already built, which were quite good enough to be used under the existing conditions. We planned to move most of them to outlying portions of the site to allow free space for our new development. We had two reasons for this: First, as it happened,

the row houses which we were building of fixed dimensions could not be fitted into the blocks with the existing houses without wasting much space. Second, the new houses were so different in appearance that even in so economical a development we felt that the gain in appearance and rentable value of the neighborhood was itself nearly worth the price of moving the old houses.

On the south side of Pine Avenue where Twenty-fourth Street jogs to the east it was originally planned to introduce a little square, produced by extending the roadway of Twenty-fourth Street from the north straight across for a distance of about 60 feet south of Pine Avenue and then turning east into the continuation of Pine Avenue as platted, facilitating traffic at this awkward jog and leaving a green island that would add to the interest of the development. It was intended to provide for stores on the south side of this square, but our real estate experts felt that to set back the stores so far from the general building line of Pine Street, a car-line street destined to be largely occupied by stores, would decrease their value, and the square was abandoned.

On site B the houses were planned on the assumption that they would be occupied by Americans of foreign birth and by later arrivals not yet Ameri-



canized, the class of labor ranging from medium grade to the lowest-paid type, but all men with families. This seemed to necessitate a variation in plan running from houses with four, five, and six rooms, in which there is a parlor as well as a combination living room and kitchen, down to houses with two bedrooms and bath above the first story and what is, for all practical purposes, one room on the ground floor, so arranged as to separate the part containing the plumbing from the part to be used as a living room by a portion to be used as passage.

The assumption as to these minimum houses was that new arrivals, having been accustomed to certain conditions in their native lands would not make effective use of housing arrangements more than a certain degree better than the old if suddenly transported into them. Whether the scheme was justifiable is not here discussed, but should the plan of these houses prove unsuccessful, or should the original conditions as then understood change by reason of the ending of the war, this type of house, of which there are but few in the present development, can easily be converted to a four-room house by the building of a partition, so as to make two rooms on the ground floor, one to be used for cooking and eating and the other as a parlor, or one as a kitchen and the other as a living room and dining room.

A peculiar feature, which marks the plan of the Niagara Falls row house as different from any others in the corporation's developments, is the position of the bathrooms. Instead of being at the second-story level they are halfway above the second story and are reached from it by means of a short flight of stairs. The advantages claimed for this position are primarily that in houses having no furnaces the warm air rises to the bathroom and prevents

the freezing of pipes, whereas, in the second-story bathrooms with outside walls in houses without furnaces the pipes are likely to freeze. Additional warmth is obtained in bathrooms in houses without a furnace by means of a drum of metal which is placed in the bathroom and through this drum passes the hot smoke from the kitchen range.

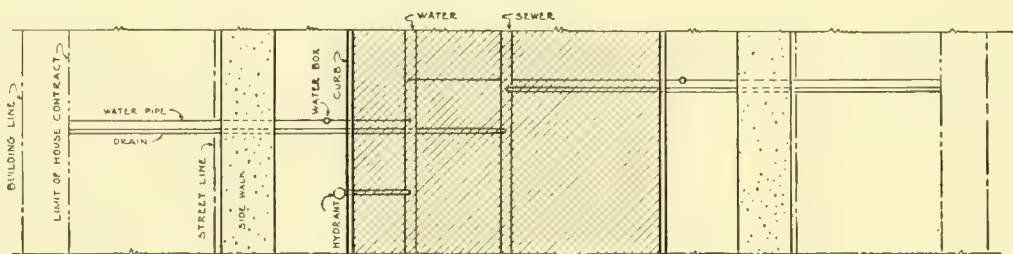
Another point to be noticed is the position of the furnace on the first floor in close proximity to the kitchen. This position obviates the necessity of a cellar, coal and wood storage being provided in a one-story shed, of ample proportions, at the rear of the building. The stairs of the houses described have no platforms. They have double "winders," which are made necessary by the using of space for the furnace in the center of the house. This is the only development of the corporation where such stairs occur.

There is no doubt that considerable saving in construction results from this type of plan and also that the heating costs less than in the house which has a cellar containing the regulation furnace, but the type of house described is more suited to what is generally called "foreign labor" than to any people who have become accustomed to more advanced modes of living with more spacious accommodation.

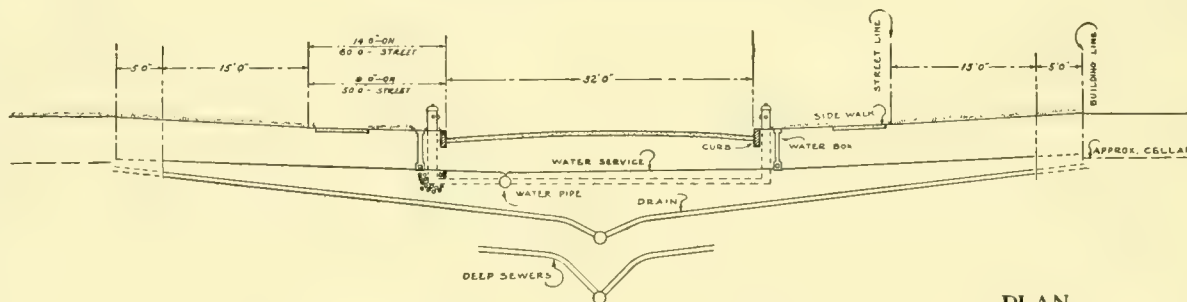
The plans lend themselves more to grouping than they do to detached building. At Niagara Falls all the houses constructed are of this kind, the smallest building being two houses, semidetached.

The use of part of a third story for a bathroom required a special design of roof and the extra bedrooms in some of the houses required that a full attic story be added. Thus there has resulted a design of building peculiar to this development with extensive roof lines carrying across four and even six houses.



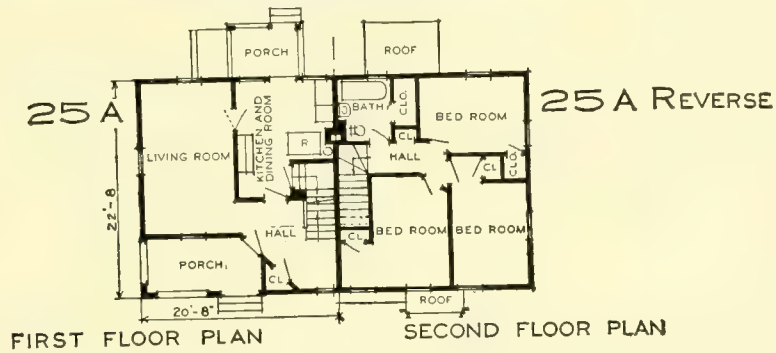
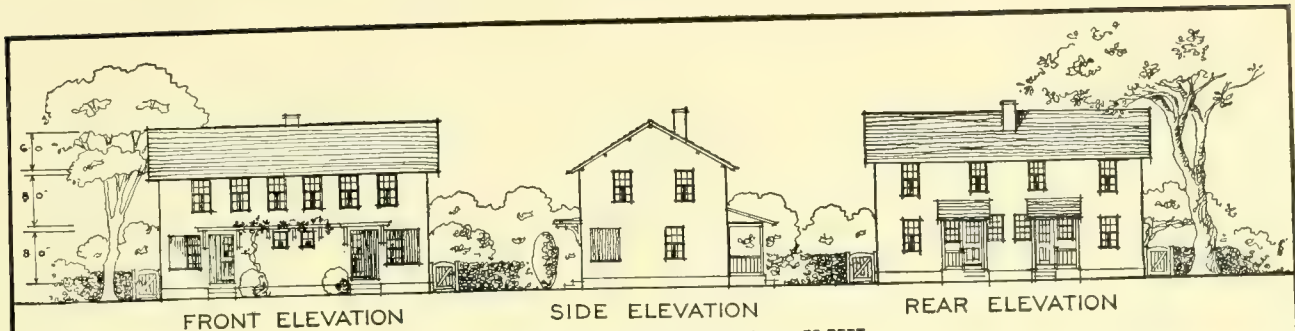


TYPICAL PLAN
OF SEWER AND WATER CONNECTIONS

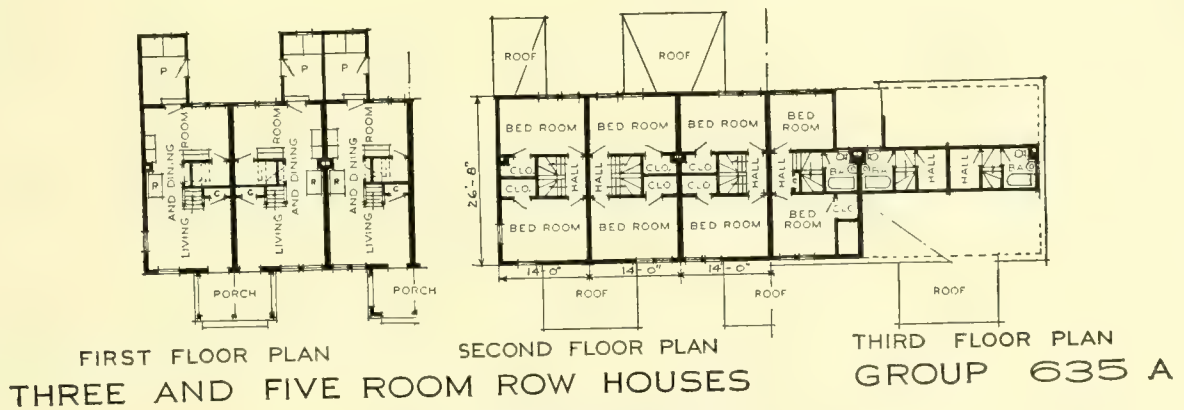
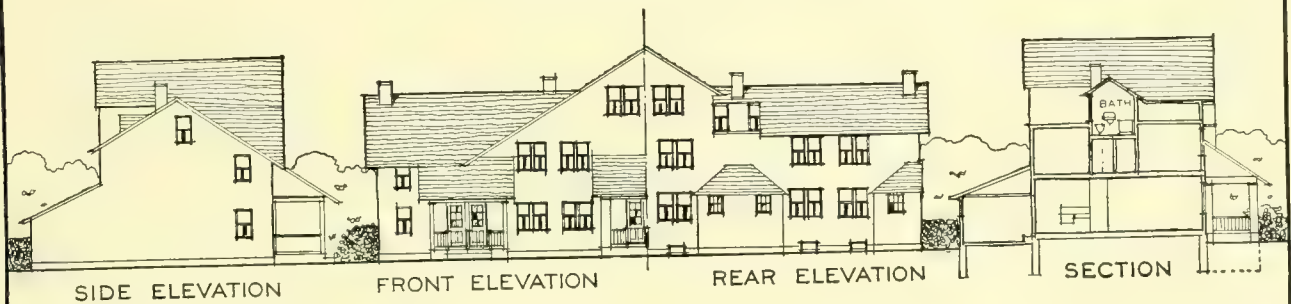


TYPICAL ARRANGEMENT OF WATER SERVICE
AND HOUSE CONNECTIONS

PLAN
AS USED AT
NIAGARA FALLS, N.Y.
U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING
AND TRANSPORTATION. U.S. HOUSING
CORPORATION. ENGINEERING.



FIVE ROOM SEMI-DETACHED HOUSES TYPE 25 A



UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NIAGARA FALLS N Y
ARCHITECTS DEAN AND DEAN

NILES, OHIO (PROJECT NO. 481).

Area planned: 25.29 acres. Housing planned: Detached houses, 103 families; semidetached houses, 14 families; total, 117 families.
Housing constructed: Detached houses, 75 families; also old house renovated, 1 family.

(For further information see tables, Chap. IX.)

Niles, Ohio, near the Pennsylvania line, is one of the series of very active industrial communities along the Mahoning River. It had a population of 8,740 in 1910 and about 11,000 in 1918. Many industries in and near Niles having war contracts were limited in their production by the shortage of housing, notably the Engel Air Craft Co., which needed to increase its employees from 700 to 2,600 in order to meet the requirements of the War Department. The Housing Corporation put on a special chartered car to operate between Warren and Niles, and arranged other improvements in the transportation service, and also undertook house construction.

The site selected as the most available is in the northeastern part of the town, not far from a public school and within a mile of the principal industries and the stores and railroad station. The soil is stiff and underlaid by rock at from 2 to 10 feet; the site is rolling, with a good slope for drainage, but receives much surface and ground water from higher land; conditions which made the storm drainage and sewerage costly.

The street plan is in part an acceptance of the existing gridiron street system, already built upon up to the borders of the property, and in part is an adjustment of that system to the angle of an existing diagonal thoroughfare, Vienna Avenue, to the topography and to the property lines. The curving deflections of the roads near the junction of Lafayette and B Streets were made in order to preserve a number of fine large trees which add greatly to the attractiveness of the project. The exceptional lot depth of 180 feet, with alleys, established by the old gridiron plan, applies to nearly half the lots in the project. The present relatively low land values make such deep lots possible, and they are locally popular, but with increasing pressure of population such a plan will invite the evil of alley dwellings except as controlled by arbitrary restrictions on the part of the

Housing Corporation or by drastic municipal regulations. On the areas not controlled by the old street plan the lots are about 130 feet deep, without alleys, and in one deep block of irregular outline a small interior block playground has been provided. The side space between houses is generally kept down to the standard minimum of 16 feet, but the use of a large proportion of bungalows makes the average lot width about 50 feet, and since the cost per foot of utilities proved to be rather high and there was a good deal of grading, lots when charged with street improvements are disproportionately costly for the houses, in spite of the moderate initial cost of land.

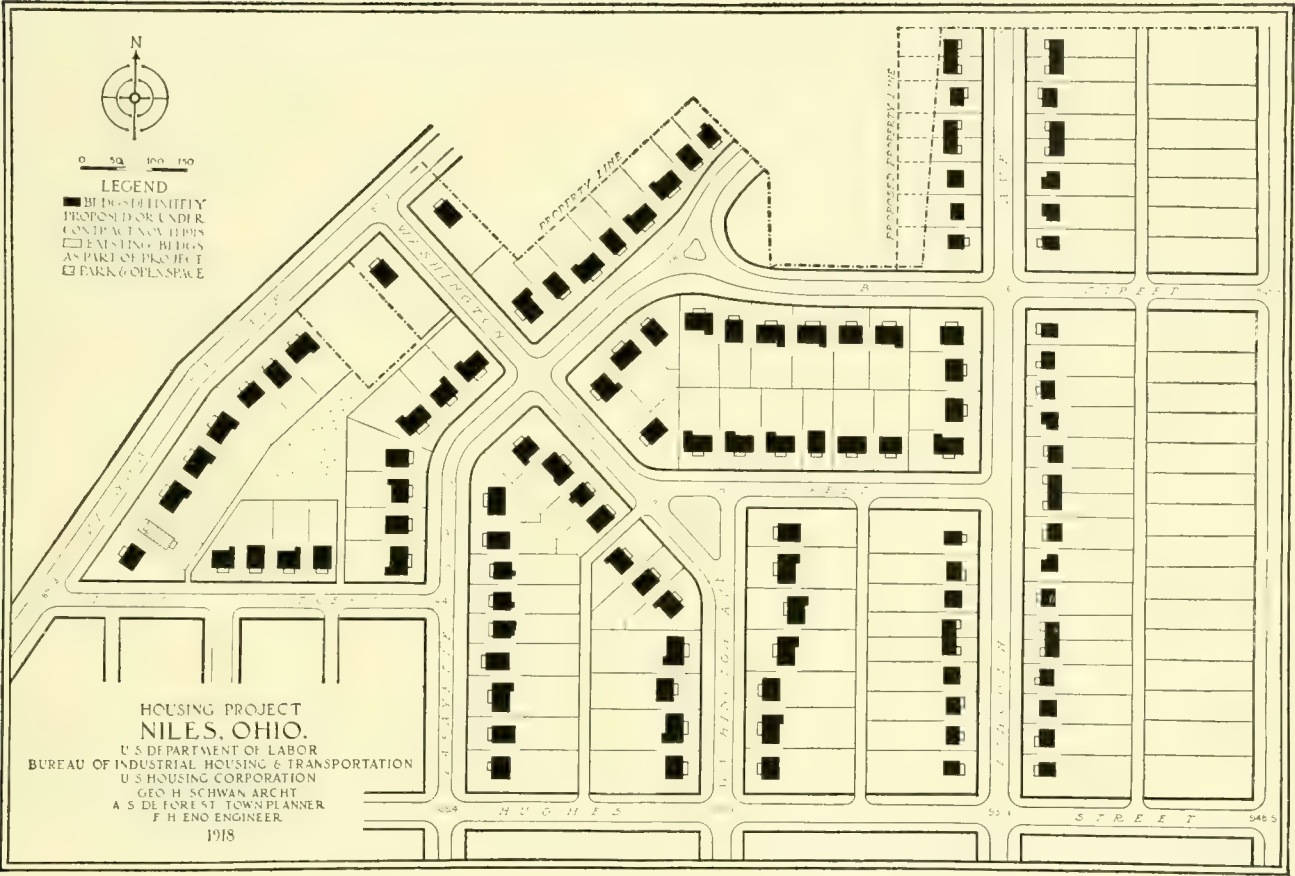
The grouping of the houses is generally good, some of the more extreme variations in setback being accounted for by the existence of large trees in the front yards which entirely justify and explain them; although on Lafayette Street the variation in setback, not accounted for by trees, seems rather forced. It is noticeable that where the building line on the west side of Lafayette Street forms a reentrant angle at the bend of the street it would have looked much better to have blunted the angle by turning the houses on each side of it so as to parallel the curve of the street.

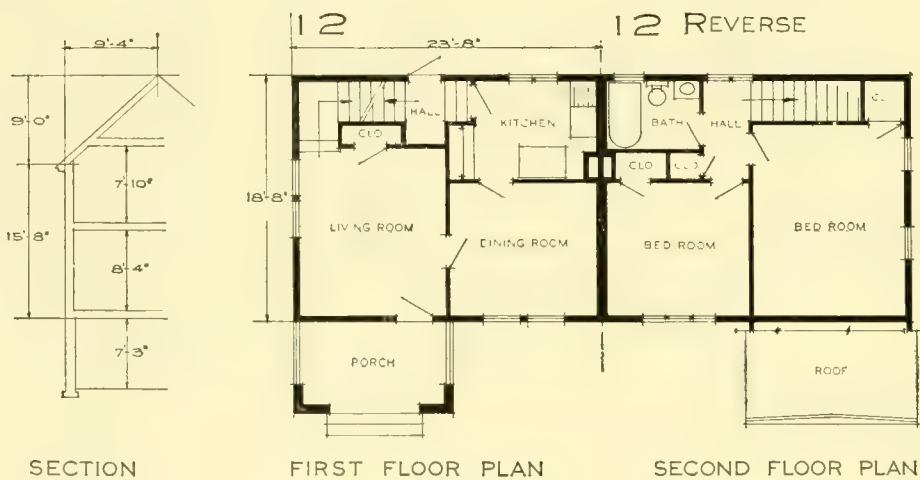
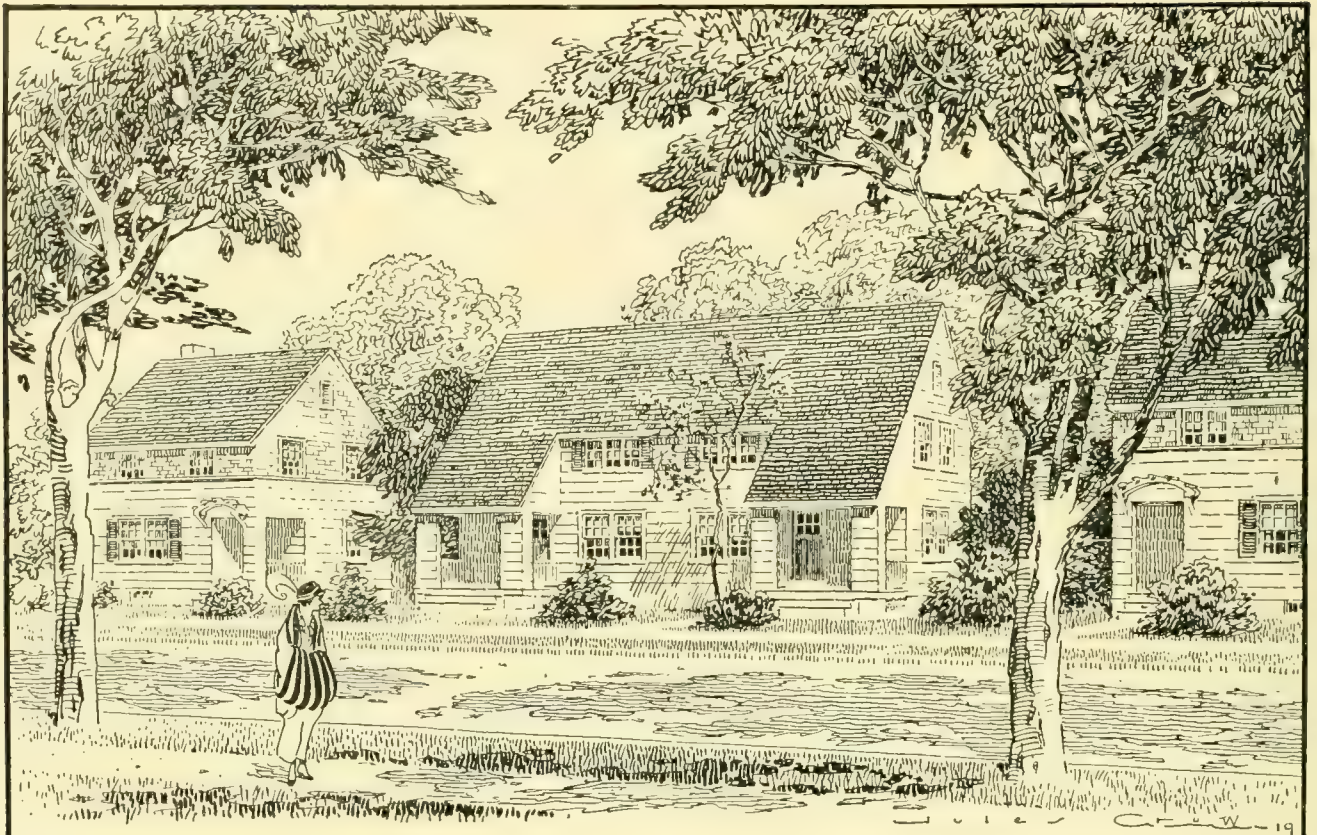
The development as constructed is composed entirely of bungalows of four, five, and six rooms each. Whatever is of interest from the standpoint of design is given by the details of porches which are the sole ornament of these houses. The general type is in every case about the same, the houses being turned in some cases, so that their long axis is parallel to the street.

The plan is simple and economical. The houses are constructed of frame with clapboard side covering, and the roofing is of asphalt shingles.

The interior walls have been covered with a wall board of improper quality for the purpose and as a result defects in the interior are likely to appear very soon. The framing work, however, as well as the masonry, is first class.





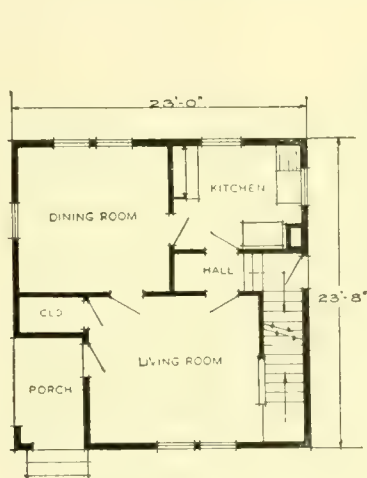
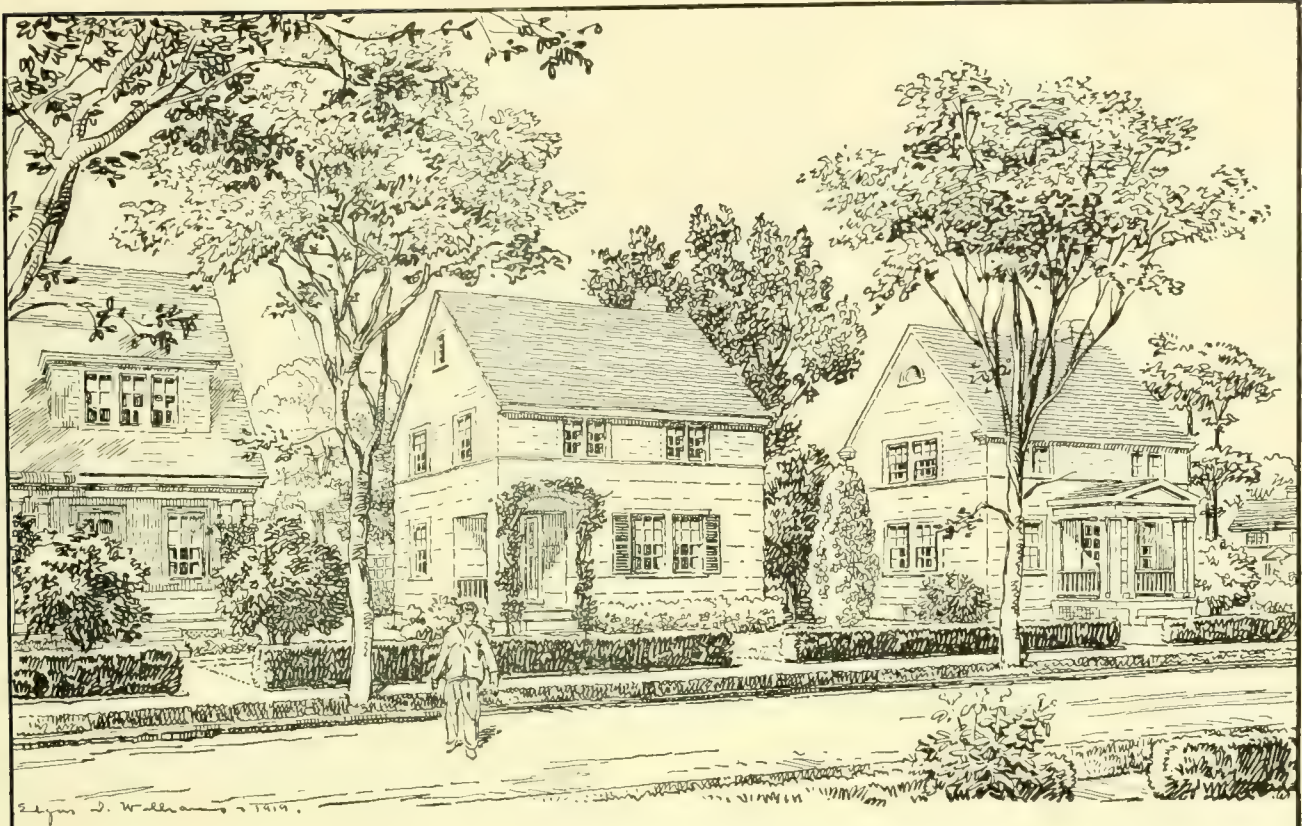


FIVE ROOM SEMI-DETACHED HOUSES TYPES 12 AND 12 R

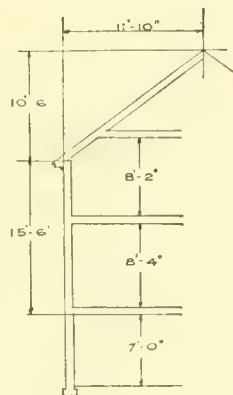
SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT NILES OHIO

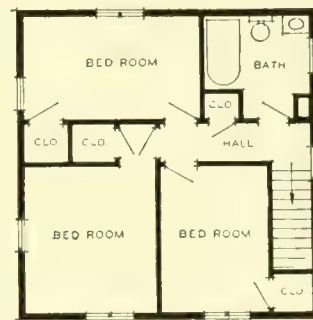
ARCHITECT GEORGE H. SCHWAN



FIRST FLOOR PLAN



SECTION



SECOND FLOOR PLAN

SIX ROOM HOUSE TYPE 7

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT NILES OHIO

ARCHITECT GEORGE H SCHWAN

NORFOLK DISTRICT (NORFOLK AND PORTSMOUTH, VA.).

The great advantage of Hampton Roads as a harbor and shipping point led to an enormous development of these facilities by the Government along various lines. The largest undertakings were the additions to the plant and to the work of the United States navy yard, the naval operating base, and the United States magazine, these being for the Navy, and the Pig Point ordnance stores, the Tanner's Creek general stores, the Engineer depot at Norfolk, and the Norfolk & Western Railroad pier, these developments being for the Army.

Between May 1, 1917, and January 1, 1918, 20,000 people came into the district—about 7,000 white workers, with 7,000 members of their families, and about 3,000 colored workers, with 3,000 members of their families. In November, 1917, complaints began to be heard of the housing shortage; by January, 1918, it was obviously very serious. In prewar times the United States navy yard and the United States magazine, the only two large employers of labor, had about 8,400 white and colored workers. In January, 1918, the various industries employed over 18,000, and the work in prospect called for at least 40,000, with a possible peak load of 52,000.

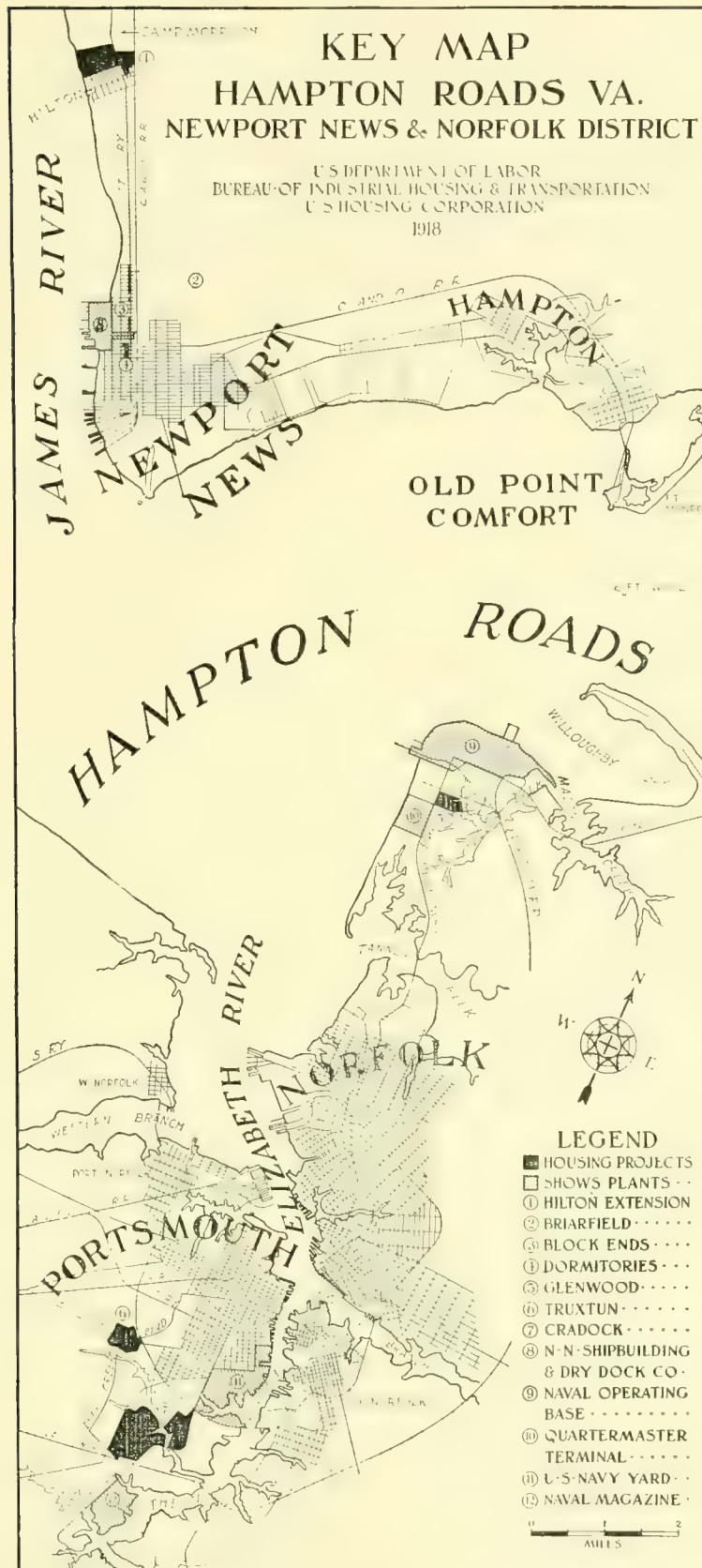
The permanent after-war population of workers was estimated at 22,275—14,775 white and 7,500 colored. On January 31, 1918, the interdepartmental housing committee, consisting of representatives from the housing committee of the Council of National Defense and of the representatives of the Army and of the Navy, after studying the results of investigations, suggested to the Secretary of War that permanent housing be provided for 3,535 white workers and 2,880 colored workers, and temporary accommodations for 6,000 white and 14,025 colored.

Even figuring three workers to a house in the permanent houses, which is more than usual, the housing for these 26,400 men was estimated to cost \$10,000,000. As the total operations of the Army and those of the Navy were of about the same size in this district, it was suggested that each pay one-half of this amount from its available funds.

The housing sites were chosen early in the history of the Housing Bureau, before the machinery of preliminary investigation and systematic discussion had been perfected. The situation was so complicated, the needs to be served so various, the available sites presented such different advantages and disadvantages, that there has been much discussion of alternatives and much balancing of different opinions even after work on the sites was well begun.

There were three sites—Glenwood (originally called Glenwood Park), in Norfolk, on Boush Creek, near the site of the old Jamestown Exposition, serving the Navy operating base and the Army operating base; Truxtun, for colored workers, just outside of Portsmouth, serving the navy yard; and Cradock, for white workers, south of Portsmouth, on Paradise Creek, also serving the navy yard.

The Housing Bureau was satisfied that Truxtun was well located and suitably designed to serve its purpose inexpensively. Both Glenwood and Cradock, however, were open to serious objections, the first on account of real-estate complications and some engineering difficulties, the second on account of its difficulty of access and the engineering difficulties inherent in its low and flat site. It is true, however, that all other alternatives offered disadvantages of other kinds which might well have proved more objectionable.



Cradock, Va. (Project No. 150a).

Area planned: 310.60 acres. Housing planned: Detached houses, 801 families; semidetached houses, 170 families; row houses, 160 families; row two-flat houses, 104 families. Total, 1,235 families. Workmen in barracks (planned to be used by Navy after construction of Cradock), 2,000.

Housing constructed: Detached houses, 417 families; semidetached houses, 144 families; row houses, 94 families; row two-flat houses, 104 families. Total, 759 families.

(For further information see tables, Chap. IX.)

The area chosen for this development was mostly open farming land, bounded on the north and cut into from the east by arms of Paradise Creek. The shores of these tidal water areas were bordered in many places with a good growth of timber, stopping at a definite line where the flat land was cultivated and falling into very pleasant groups. There was also a patch of woodland, some areas of more scattered trees, and a low area, almost a fresh-water swamp, in the southern part of the site near the Tidewater Railroad. The land was almost absolutely flat, the greatest difference of elevation in the surface, except on the creek banks, being about 3 feet, and the average surface being only about 10 to 12 feet above mean low tide. The soil had a very high water plane, ranging from the surface of the ground in wet weather to about 3 feet below the surface in dry weather.

The tidal variations of the water in Paradise Creek introduced a serious problem, because though the creek is very attractive at high tide it is largely a mud flat at low tide. It was at one time proposed to fill most of these flats, in connection with large dredging operations farther downstream, but this did not then prove practicable. At present it is proposed merely to do such filling and cleaning as will prevent the standing of any fresh water to breed mosquitoes.

To provide reasonable access from Cradock to the navy yard on the shortest line, and thence to Portsmouth, two bridges are necessary, one postponed for the present, to carry Gilmerton Boulevard on a continuous line across the creek, the other, already built by the Housing Corporation, connecting Gilliss Road with Gilmerton Boulevard, as extended. Also it was necessary to construct and properly pave the extension of Gilmerton Boulevard from the creek to the navy yard, both for the future traffic to and from Cradock and for the convenience of the present construction of the town, for the existing roads, poor enough at best,

were turned into a slough in wet weather by heavy traffic.

In arranging the street system of the project a long diagonal, Gilliss Road, was run to the further corner of the scheme from the bridge over Paradise Creek. A main traffic boulevard, Afton Parkway, was laid out generally east and west through the heart of the development, and a spur of the trolley line runs through the town upon it. A main residential and promenade parkway, Prospect Parkway, was built at right angles to the main part of Afton Parkway, from the wooded area of Afton Park to the schoolhouse site on Prospect Field. The town center is in the heart of the scheme, with all these main traffic lines passing through or near it.

The particular form of the street layout as shown on the plan came about from the adaptation of these main requirements to the existing topography and the determined lot and block sizes.

The choice of street names and their arrangement was carefully worked out. The two main intersecting thoroughfares with central planting strips are called Afton and Prospect Parkways. The main encircling thoroughfares are called Dahlgren and Alden Avenues. The diagonal thoroughfare is called Gilliss Road. The rest are called streets, with the exception of those which are not direct through ways and are only one block long, which are called places.

All the street names are those of men of note in the United States Navy. The names of the streets are arranged alphabetically from northwest to southeast. The names of the places are arranged more or less alphabetically in a circumference, beginning at Prospect Field and running contraclockwise, but also they are so located that for the most part where they are parallel to streets their names begin with the same or the next letter as the name of the street.

The orientation of the streets and consequently of the houses is less important here than at Truxtun because the houses are farther apart. At Cradock most of the houses face northwest and southeast.

The central portion of the street scheme is almost absolutely a gridiron, and the lack of satisfactory terminations for many of the street vistas is unpleasantly noticeable on the ground. In the case of the streets transverse to Afton Parkway, for example, both the designers and the Corporation feel that it would have looked better to deflect



them all from the rectangular system at a distance of one block from that central thoroughfare, as was done in the case of Gilliss Road and Burtis Street. Also the regularly repeated arrangement of the houses on consecutive blocks produces a series of unintentional vistas across the blocks. These are undesirable, and at present, the planting not being grown, they are very conspicuous, but later they will be mostly stopped by foliage in the summer, and at least interrupted even in the winter, particularly as there will be some small buildings such as garages in the interiors of the blocks.

Cradock being so far from Portsmouth, it was necessary to provide most of the community facilities, such as schools, stores, fire-engine house, a small hotel, community recreation building, and market. Some of these may be now provided only sufficiently to serve the present development, for instance only a few stores will be built at once, the rest to be built by private enterprise as they are needed. Similarly a temporary school is planned to be built at once, the permanent buildings being postponed until construction is relatively cheaper. The hospital as shown serves not only Cradock itself but also accident cases from the navy yard. Only a small part of it, for present uses, is now to be built. Sites for churches were provided, to be turned over to responsible church societies at a low or nominal charge.

A group of wooden row two-flat houses for 104 families, around a central court, was built to offer some housing relief at the earliest possible moment. For the same reason a district of 112 ready-cut temporary houses was planned and 93 were built between Gilliss Road and Virginia Road. The armistice occurring at this point in this construction, the rest were not erected.

It was intended that the barracks erected for the men who were building Cradock should, when the town was finished, serve some of the single workmen employed in the navy yard, but this will now presumably prove to be unnecessary.

The water supply for Cradock is to be obtained from the existing water system located in Portsmouth. This necessitated carrying a 16-inch water line from the Goodwin Street Pumping Station to the Belt Line Railroad and a 12-inch main from this point to the housing development, the total length of 16-inch and 12-inch pipe aggregating slightly more than 2 miles and costing approximately \$85,000.

The distribution system within the development is made up of 12, 8, 6, and 4 inch mains, with sufficient hydrants to provide necessary fire protection. All services are to be metered.

The entire cost of the water-distribution system has been borne by the Housing Corporation. A contract is now being negotiated with the city of Portsmouth whereby they will probably take over and maintain either part of all of the water connections and distribution system. The water-distributing mains have been placed with a 2½-foot cover of earth. Cast-iron pipe has been used throughout for the distribution mains while galvanized wrought-iron pipe was used for the house services. The meters are all placed outside in a well-protected vitrified sewer-pipe housing with cast-iron top and cover.

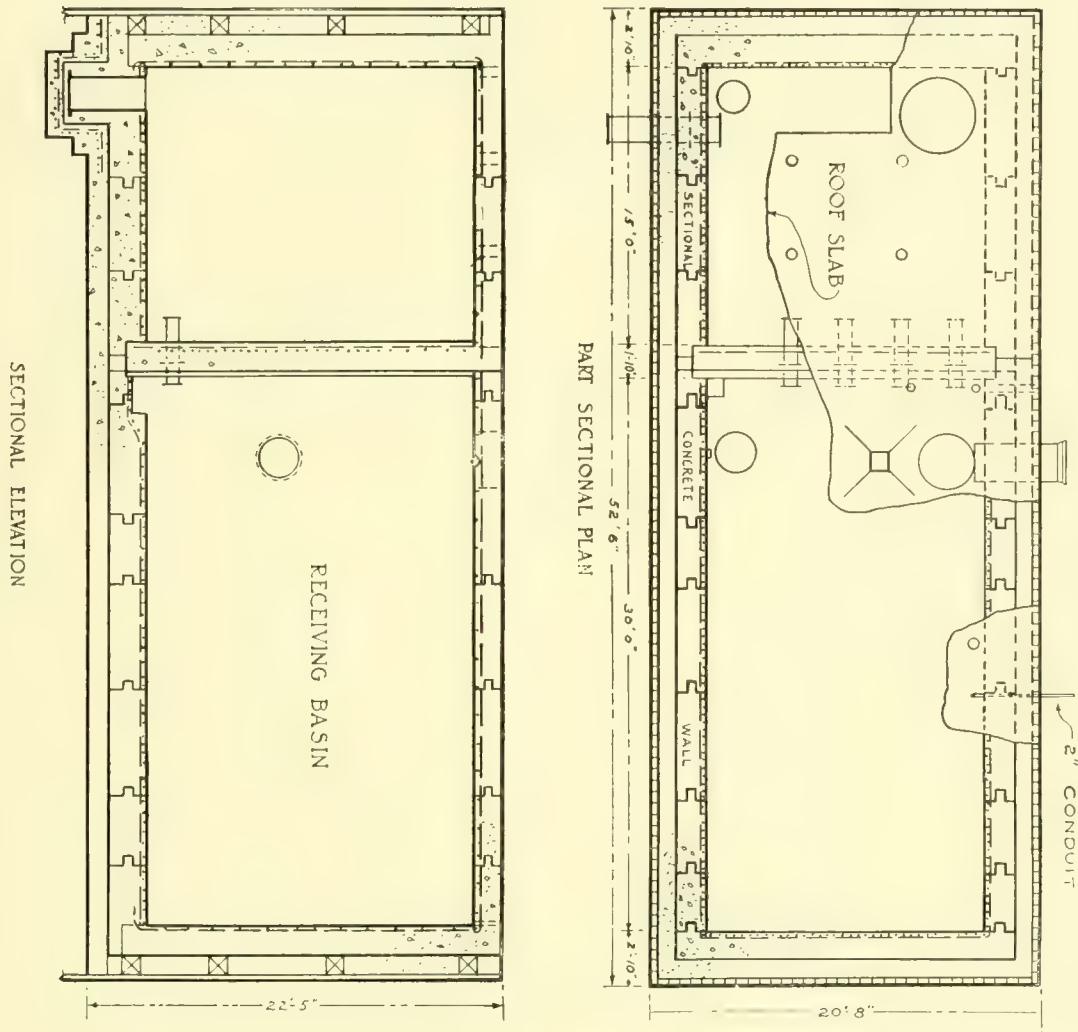
The most difficult utilities to provide at Cradock were the sanitary and storm-water sewers. Separate systems are to be installed, the storm-water draining into the nearest little valley or ravine, while the sanitary sewers drain to a sewerage-pump well. This is located in the central parking, at the intersection of Harris Street and Afton Parkway. The outfall sewer discharges into deep water in the southern branch of the Elizabeth River.

The storm-water drains have been reduced to the very minimum in order to reduce expense. In general, these will care for 1 inch of rainfall, and vary in size from 12 inches to 30 inches.

Sanitary sewers vary in size from 24 inches to 8 inches. The minimum grade for the 8-inch laterals has been fixed at 0.25 of 1 per cent. This grade is not sufficient to furnish a 2-foot velocity, but owing to construction difficulties this minimum was established, and it is felt no trouble will follow.

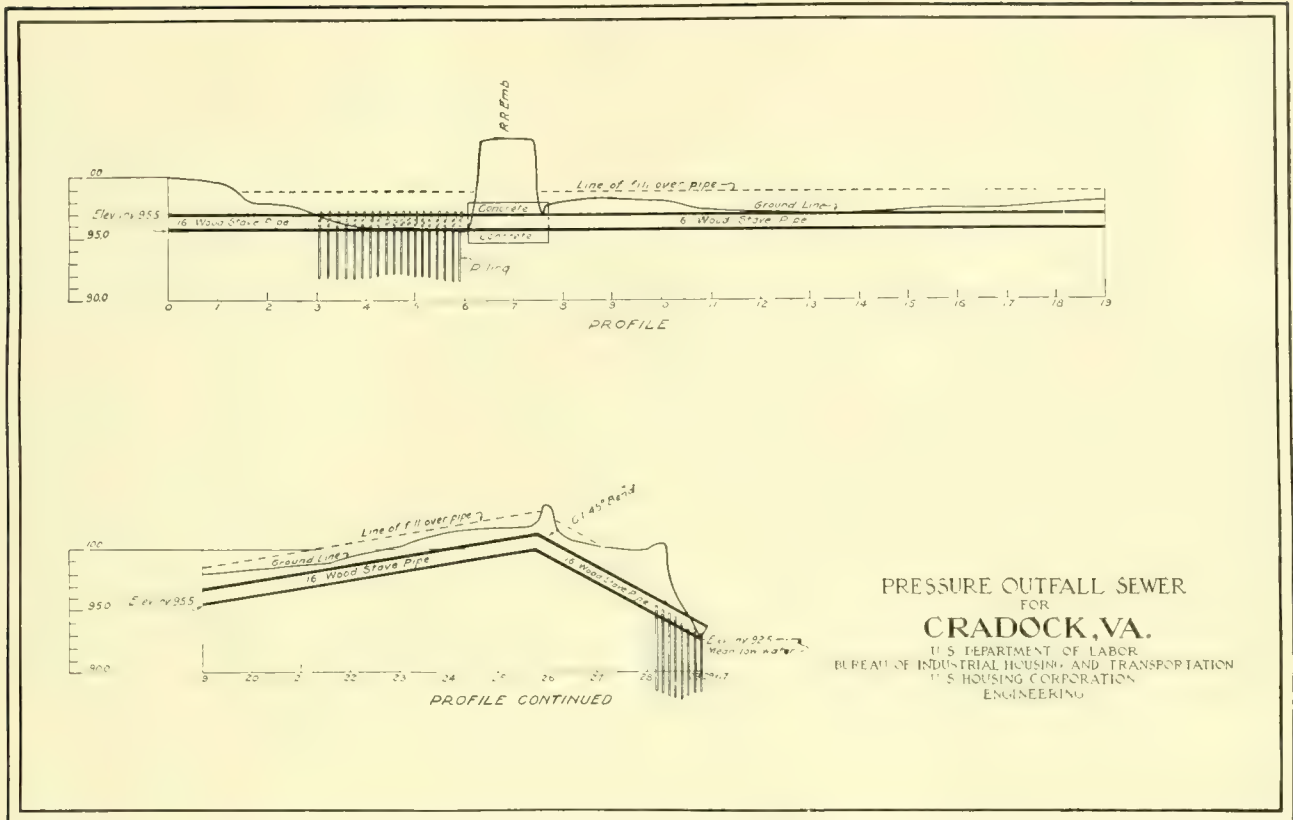
As previously stated the ground-water plane varies from zero to a maximum of 3 feet below the surface. At an approximate depth of 4 feet a blue, running sand is encountered. The minimum depth allowed for sanitary sewers has been held to 3 feet. This means that practically all of the trenching required in connection with the sewer system must be tightly sheathed, freeing the ground of water. The maximum depth for the sewers is 13 feet.

The material of construction is vitrified clay sewer pipe, except sewage outfall, which is of wood stave pipe. All houses, including barracks and temporary houses, are provided with sanitary sewers and water.



SEWAGE PUMPING STATION CRADOCK, VA.

U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING & TRANSPORTATION
U.S. HOUSING CORPORATION. ENGINEERING



The sewage-pump well is 47 feet by 15 feet in plan, inside dimensions with a depth of 19 feet. The house for the pumping units and transformers will be approximately 18 feet by 22 feet in plan, and surmounts this well. This building will accommodate three motor-driven vertical shaft, centrifugal pumps and the necessary electric control board and transformers. Each of the three pumps is to have a capacity of 1,000,000 gallons per 24 hours against an average total head of 17 feet with a maximum of $32\frac{1}{2}$ feet and a minimum of 10 feet. These pumps will discharge into a 16-inch wood stave pipe, which has its outlet, as previously stated, in the southern branch of the Elizabeth River.

The electric lighting system will consist of that required for street lighting and for the furnishing of lights in the residences. Electricity is to be furnished by the Virginia Light & Power Co., which in turn will operate and maintain both the street lighting and house distribution system.

The rates charges are to be identical with those now in force in the city of Portsmouth.

A contract has been consummated between the United States Housing Corporation and the Virginia Light & Power Co. whereby the Virginia Light & Power Co. is to acquire the extensions which have

been made at an appraised value which is to be made one year after the close of the war.

The distribution lines have been placed so far as possible upon easements or rights of way located on the rear lot lines, thus eliminating the pole-and-wire construction so far as possible upon the streets.

The original plans for street improvements provided only a concrete pavement in Afton Parkway. This was to extend, in the original plan, from the Shell Road to the Gilmerton Railway Line. Under the modified building program a concrete roadway is to be built on Gilliss Road from the bridge at Paradise Creek to Afton Parkway, and a concrete pavement in Afton Parkway to extend only from the intersection at Gilliss Road to Shell Road.

The material which has been used as ballast under the temporary railway spurs, that have been used for construction purposes, is to be removed and applied to the streets connecting with Afton Parkway. The question of providing sufficient material to macadamize these roads with an 8-foot driveway of 9-inch depth is now under consideration.

A $3\frac{1}{2}$ -foot concrete sidewalk is to be constructed in all of the streets where buildings are located.

The labor question in constructing this development was a very serious one. Scouts were sent all

over the country, into Missouri and as far as Texas to bring in labor, and a maximum labor force of over 3,000 was employed. In addition to the labor camp for white workers a labor camp for Negroes, housing approximately 500, was erected. These men are housed and fed by means of a commissary operated by the construction division of the corporation. The meals furnished by the construction division were of excellent quality, and a welfare building and other inducements were provided; but the labor secured was largely of the floating type and the labor turnover was approximately 30 per cent per month. When the armistice was signed this condition was changed to a considerable extent.

A part of the program was the erection of approximately 95 ready-cut bungalows which were built to provide housing facilities more speedily than could be expected from the permanent houses. An interesting thing in this connection was that, considering the large number of houses of a more permanent type which were to be erected, we could put up a permanent house almost as quickly as we could put up a portable house.

Upon starting the work it was determined that approximately 4,000 cars of material had to be handled, coming in at certain times at the rate of 60 or 70 per day, and sometimes more. A railroad track was therefore installed on the property, with a double line at one part, making in all a loop of 2.7 miles. This provided facilities for unloading the cars directly at the storehouses, which were erected alongside the car track, so that the material could be handled quickly and efficiently. Approximately 9,000,000 feet of lumber were required by the various buildings.

A central concrete plant was erected for mixing concrete for the foundations and utility work. This plant was next to the railroad track, and carloads of cement were run up alongside the plant, unloaded at the storehouse, and then placed on an escalator and carried to the bins at the top of the plant where the cement was mixed with the sand and gravel, and thus a continuous stream of concrete was going from morning to night. Sand and gravel came in by the carload and were emptied by means of a clamshell which operated rapidly. The material was swung around and dumped in piles, sometimes from two to three stories in height, and, when it came time to mix, the clamshell would deposit the amount in correct proportion into the bin through which it passed to be mixed with the

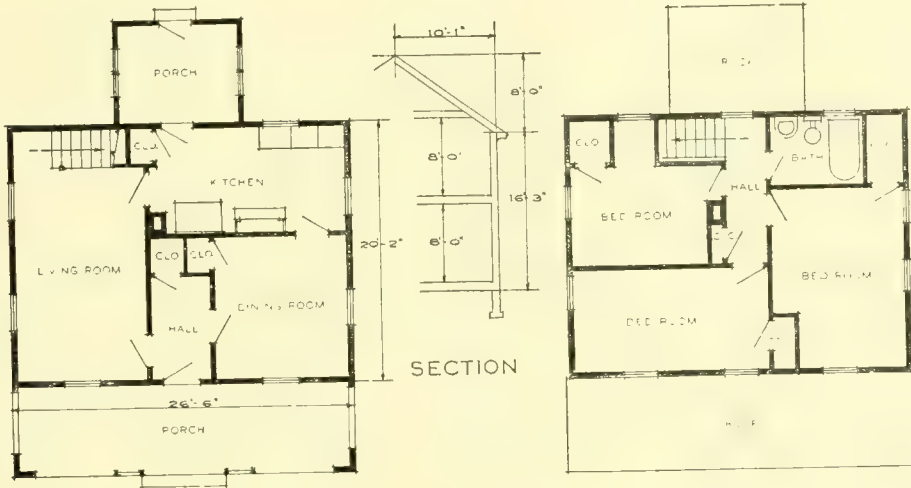
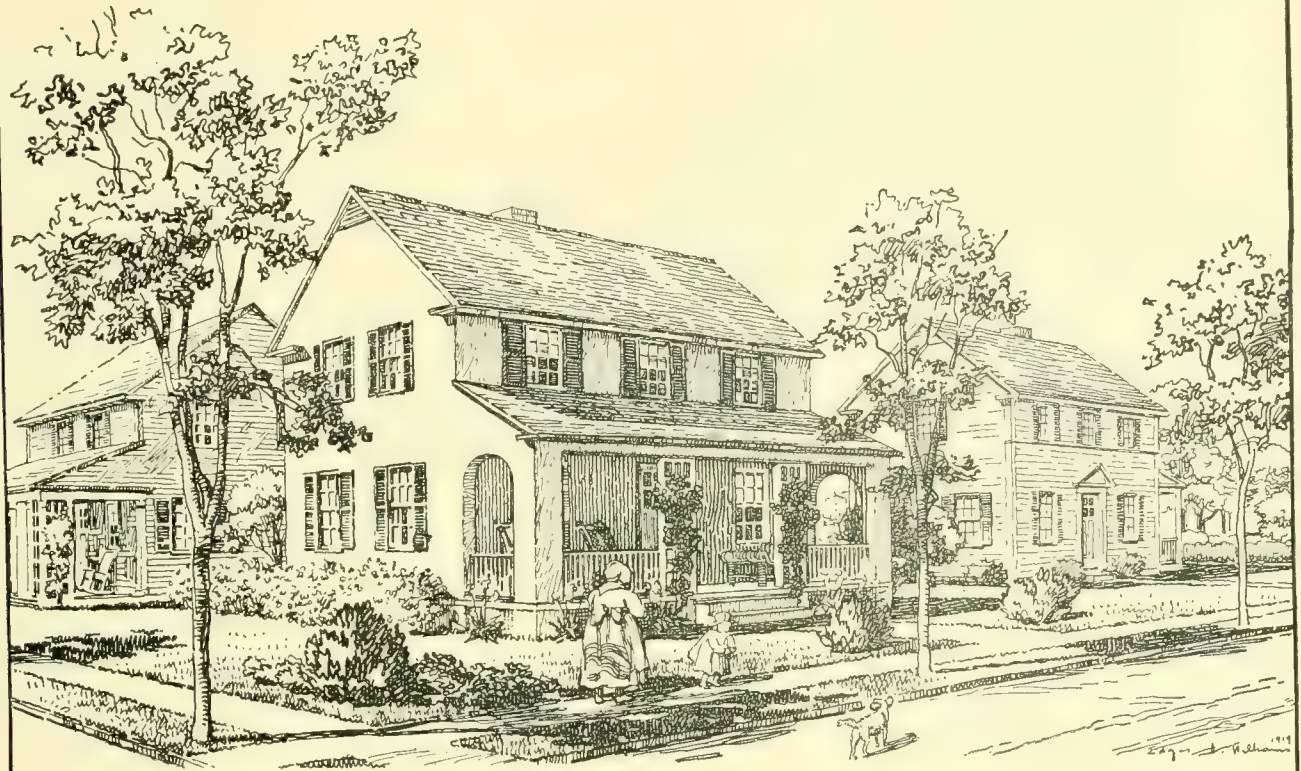
cement. The water was poured into the mixture from a tank erected at the top of the plant. Caterpillar tractors hauled special wagons carrying the concrete to whatever place was desired throughout the square mile of the project. These tractors were only about 7 feet long, but most powerful. An elbow arrangement with a blade was fastened to the wheels of the wagons so that while the concrete was being carried from the central plant to where it was to be used, it was being constantly stirred to keep it alive.

The method of erecting the buildings was to build the project in sections, by forming gangs of workmen to perform a certain fixed kind of work, and by repetition make them more efficient. Portable sawmills were erected on the site to take care of and cut all framing lumber, and door and window frames. The amount of material required for each house was all sorted and stacked in a pile near where it was to be used. All the framing for the houses was cut at the mill so that all that had to be done was to assemble it in the field. The walls of the houses were erected on the ground and then lifted up into place. Key plans were made whereby each piece of framing lumber was noted and readily assembled.

A temporary hospital, which will at some time form a part of the permanent hospital group, was erected to take care of the emergency cases. Fire engines were purchased and a fire force was organized.

Owing to the intense desire for speed, which seemed to permeate the very atmosphere, and the tension under which everyone was living, it was necessary to provide a guard to protect the property and prevent quarrels. The guard consisted of 150 marines, and access to and egress from the property was had by means of a pass. The guards made periodic inspection of the negro labor camps and after each inspection came away with a small arsenal of arms.

Upon entering the precincts of Cradock, one is first struck by the size of the project, which is the largest which the United States Housing Corporation completed. The next feature to impress itself on the visitor is the monotonous expanse of slate-surfaced asphalt shingle roof covering, all of one color. But whatever one's impression is of this latter feature, it gives way, as he walks up and down the streets, to admiration of the individual houses. Unlike the houses of many of the Cor-



FIRST FLOOR PLAN

SECOND FLOOR PLAN

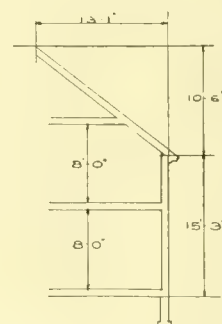
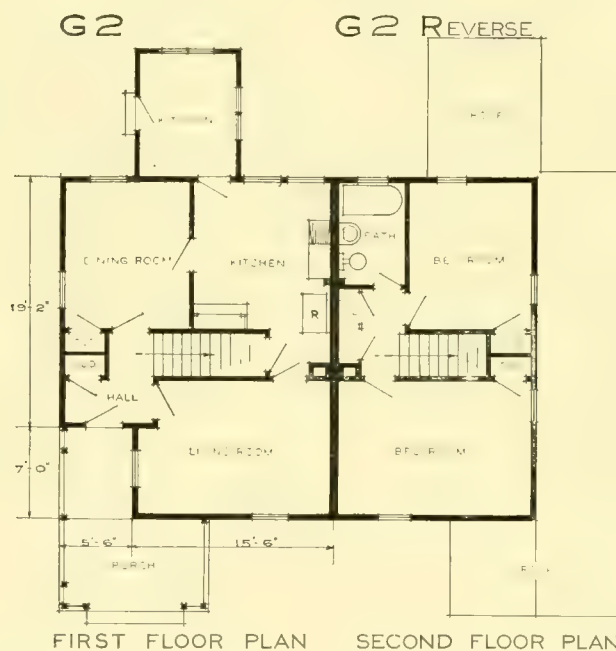
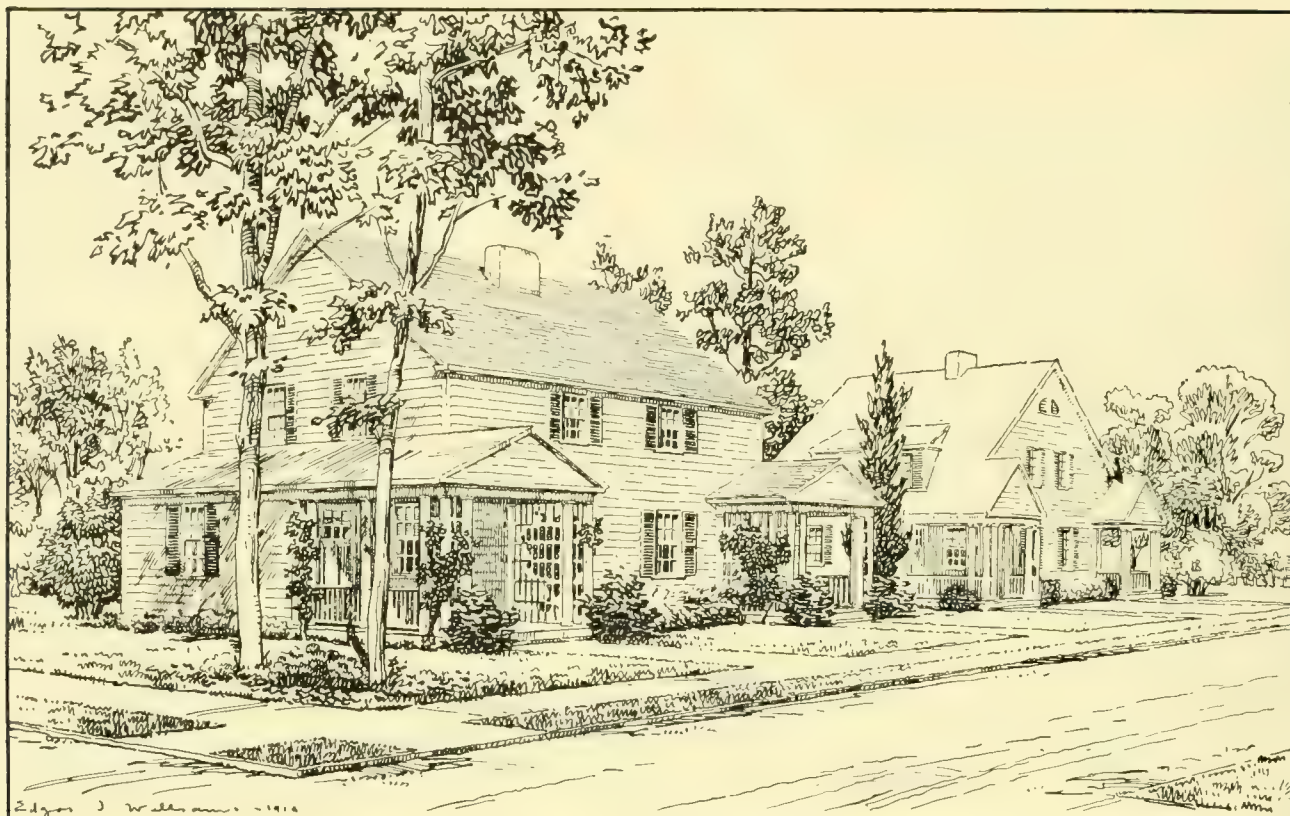
SIX ROOM HOUSE

TYPE C 8

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT PORTSMOUTH VA

ARCHITECTS GEORGE B POST AND SONS



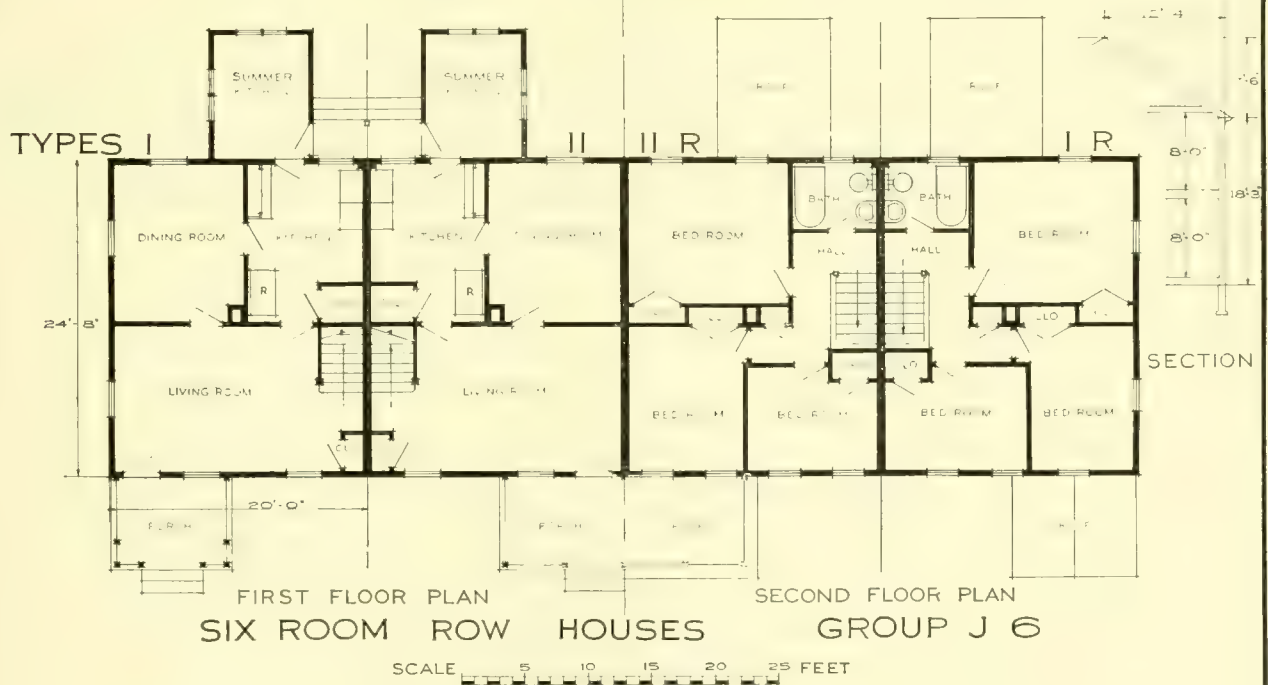
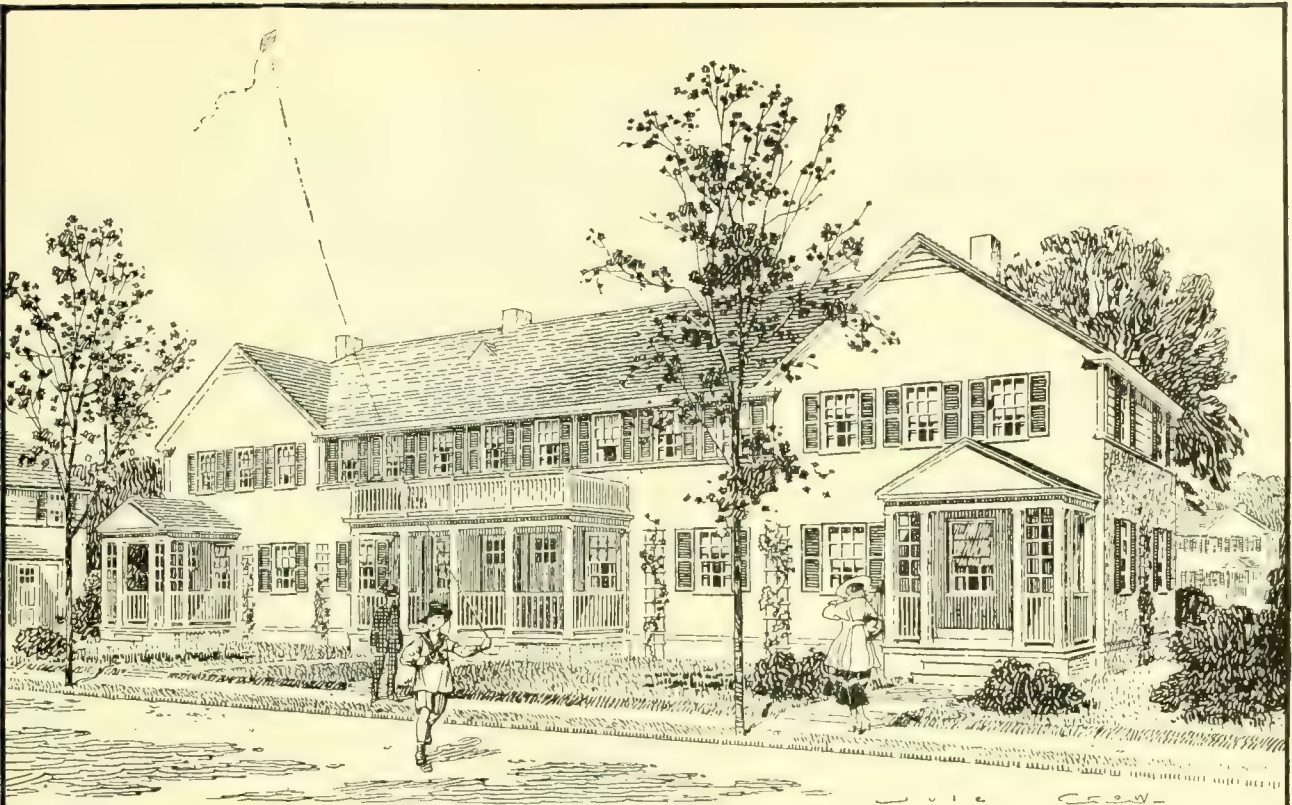
SECTION

FIVE ROOM SEMI-DETACHED HOUSES TYPES G2 AND G2R

SCALE 0 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT PORTSMOUTH VA

ARCHITECTS GEORGE B POST AND SONS

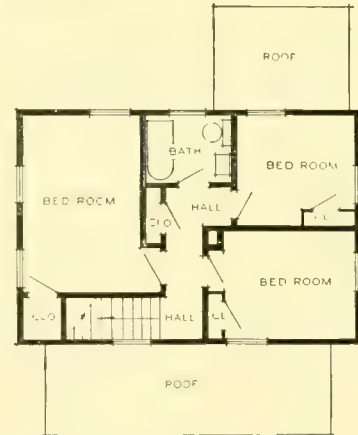
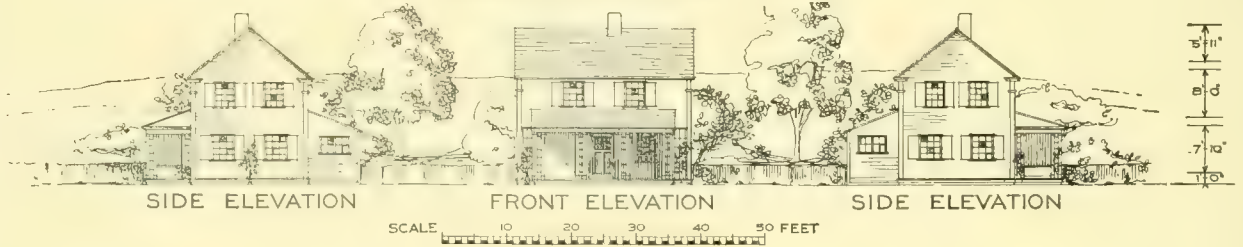
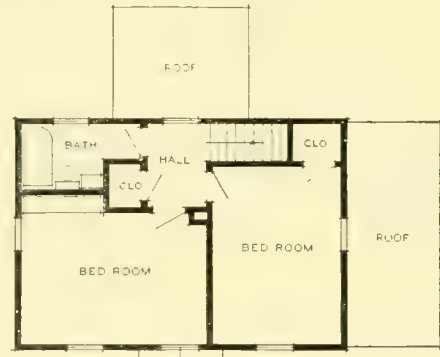
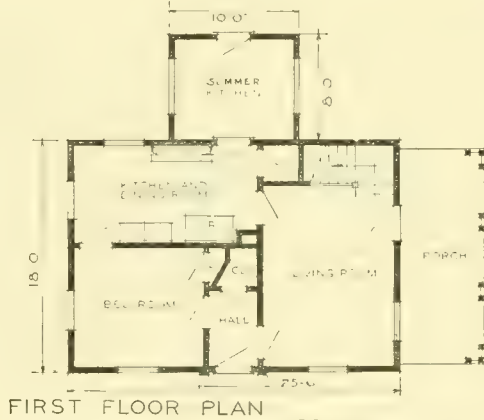


UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT PORTSMOUTH VA

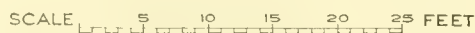
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FIVE ROOM HOUSE TYPE B2

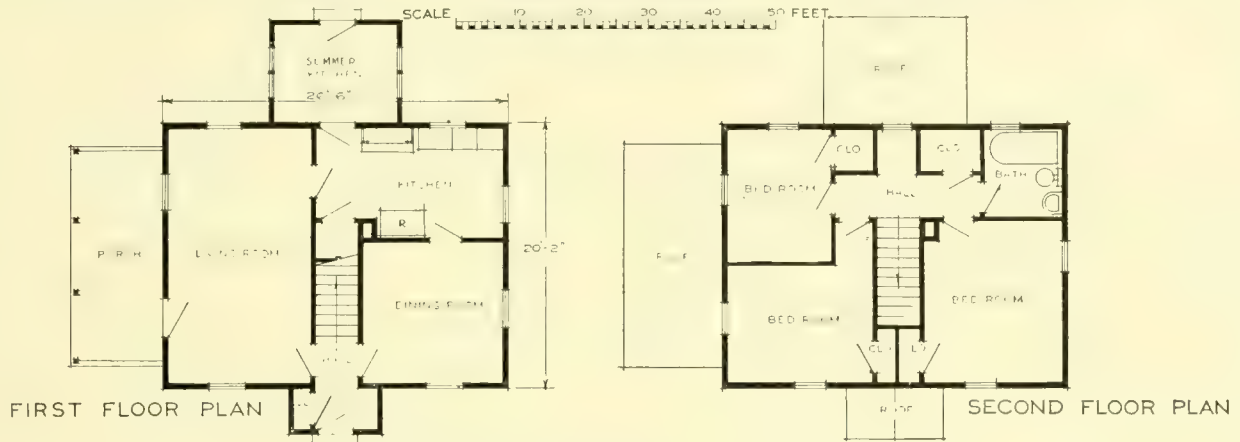


FIVE ROOM HOUSE TYPE B4



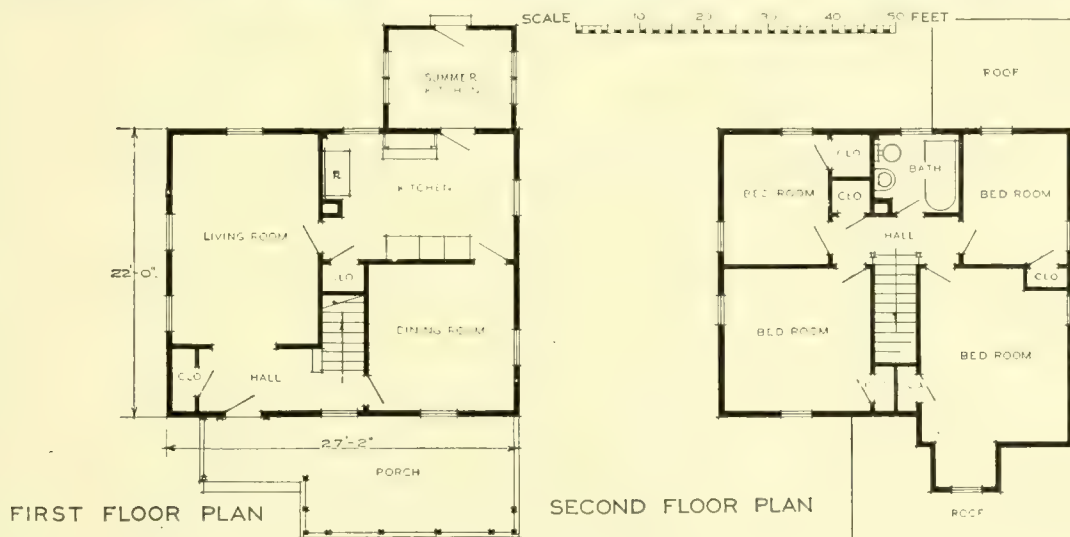
UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT PORTSMOUTH VA

ARCHITECTS GEORGE B POST AND SONS



SIX ROOM HOUSE TYPE C1

SCALE 5 10 15 20 25 FEET



SEVEN ROOM HOUSE TYPE D4

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT PORTSMOUTH VA
ARCHITECTS GEORGE B POST AND SONS

poration's developments, the Cradock houses are specially ample in size, suitable for the very highest paid type of worker.

Admiration is aroused by the uniform beauty of all the types, of which there are some 50 designs, made up of about 40 different plans. It would be difficult to select one type as better than another. The greatest single element of this beauty lies in the roof lines. On account of the sizes of the houses it was possible for slopes to be used without cutting off too much of the room areas. The sloping roofs give very desirable effects of lowness. The details of cornices and railings and the colors have all been worked out with great nicety. Here we have shingled, clapboarded, and stucco houses as well as some with stucco in combination with shingles or clapboards.

The project was designed before the stringent rules of the War Industries Board went into effect and before the standard plans had been formulated, and though in many particulars the desire for economy affected the development there was enough leeway allowed to make it more easily possible to design and construct in such a manner as to produce a very satisfactory architectural result.

There are, however, a few details which might be improved upon, but they refer to construction rather than design, and many of these details were done in the interests of conservation when the later rulings of the War Industries Board forced themselves upon the project.

In order to save material, a great many of the houses have been set rather too low, being but one step from the grade level to the piazza floors. This gives but little space for ventilation under the first story beams, as there are no cellars under the houses because of the height of the normal ground water level.

The usual construction for houses of this type is to place the sill on the foundations, painting that part of the sill which rests on masonry, in order to protect it from moisture. But in the present instance, the first story floor beams rest on the foundation and the sills on the floor beams. This was found to be questionable practice, not only because the ends of the floor beams are embedded in concrete and therefore have a tendency to rot, but also because of the cost of finishing the water table against the ends of the floor beams. This required the setting of strips back of the water table to make it come straight, a considerable total expense.

The omission of cellars made necessary the use of heaters placed in the living room, with piping run to the radiators in second story rooms, the heater itself warming the living room.

The series of apartment houses at the westerly end of the project is well planned except so far as the kitchens are concerned, which are entirely too small for the use of coal ranges instead of gas ranges.

The United States Housing Corporation has erected here, as elsewhere, a great many portable one-story houses which is the name given to a bungalow made in sections at the mill and put up without the necessity of doing any framing at the site.

In principle the idea is good, but perhaps on account of the haste used in constructing the different sections at the mill, or perhaps by reason of the necessity of using green material, the fitting of the parts was, in the case of Cradock, rather difficult and required more than an ordinary amount of labor and care, thus defeating the object sought—economy of time in erection. On the whole, though the interior is very rough in character, these houses serve their limited uses well.

Glenwood Park, Va. (Project No. 150b).

Area planned: 79.27 acres. Housing planned: Detached houses, 136 families; semidetached houses, 374 families; row houses, 138 families. Total, 648 families.

(Project discontinued. For further information see tables, Chap. IX.)

The land which we had decided to acquire as the "Glenwood Park" site had already been laid out into streets and lots, and a considerable number of the lots sold to private owners. On most of these lots only partial payments had been made. Four houses only stood on the land which we were to acquire, three recently built on house lots, one an old house built before the land was subdivided. The terms of sale of the house lots apparently pledged the development company to do certain street construction and consequent grading.

We prepared alternative estimates to determine whether it would be better to accept the platted street system or to construct another which should be more economical of land and in construction. We decided on the latter alternative. It was evident that this entailed a difficult and complicated piece of real estate negotiation, though any dealing with this land as a whole would have been difficult in this respect.

Since the land along Jamestown Boulevard was more expensive, and might soon in any case come

to some commercial use, we planned to acquire only a reasonable outlet to this street, developing instead the back land, which was less expensive.

The problem of surface drainage was particularly difficult, on account of the slight elevation of most of the ground above tide. The water was to be carried in gutters as far as possible, and then in open ditches along the back lines of the lots to allow of the flattest possible gradient.

The water supply is owned by the city of Norfolk. Arrangements were made whereby the United States Housing Corporation would construct its own mains and connect with those belonging to the city and purchase the water from them.

The natural flow of the sewage would be toward Boush Creek, and on account of the slight flow and the danger of contaminating this small stream it was thought desirable to join in with the Army base and pump the sewage into Hampton Roads.

A contract was entered into with the City Gas Co. wherein the Housing Corporation would construct the gas mains. The gas company would at the end of three years purchase the mains at an appraised value, paying interest at the rate of 5 per cent.

The Virginia Railway & Power Co. operates in this district. Arrangements were made for the United States Housing Corporation to construct the necessary lines for the development. The Virginia Railway & Power Co. would at the end of from three to five years purchase the equipment at an appraised value and would pay interest at the rate of 5 per cent.

The street system which we adopted gave shallower lots than the previous scheme, with a greater density of population, and fitted the topography much better by avoiding cuts and fills along the shore and in the swales and gullies leading down to the water.

We placed the stores just within our development, rather than on Jamestown Boulevard, for convenience to our project and to conserve values.

The streets were arranged to lead readily to this center, and so to the boulevard, the electric line to Norfolk, and the plants where the workmen were to be employed. This street system recognized also the future diagonal traffic through the center from the bridge over Boush Creek, southeast of the development.

As the plan stood at the time that the project was abandoned, the placing of the houses on the ends

of some of the blocks was unfortunate, since it prevented a straightforward layout of pole lines along the backs of the lots. The resulting poles in the streets would have been particularly bad in a scheme of such small-scale buildings as this would have been. The reason this was allowed was that we hoped that at some future time the density of the development would admit of putting all the wires underground without too much cost per house.

On a group of lots in the southeast portion of the development we started the construction of "ready-cut" houses, in order to produce some housing facilities with the utmost possible speed. This building was going on at the same time as the work on the construction camp, which was on the land across the boulevard from Glenwood Park. At this juncture the armistice caused all work on the project to be abandoned.

Truxtun (Project No. 150c).

Area planned: 43.22 acres. Housing planned: Detached houses, 203 families; semidetached houses, 50 families. Total, 253 families.

Housing constructed: Detached houses, 200 families; semidetached houses, 50 families. Total, 250 families.

(For further information see tables, Chap. IX.)

The site of Truxtun was a proper one for a negro development, since the land between it and the navy yard was already occupied by Negroes where built up at all, and this class of occupancy would naturally in any case expand toward Truxtun and eventually include it. This, too, was a desirable arrangement of population from the point of view of Portsmouth, as it did not force the colored people to traverse a white neighborhood on their way to work or to town, nor did it force much white pedestrian traffic through the colored neighborhood.

Key Road gives access to the navy yard about three-eighths of a mile away. Deep Creek Boulevard runs with reasonable directness to the center of Portsmouth, about a mile away. The land acquired for the development at Truxtun had been in part plotted in streets, and a few improvements constructed, but it was still practically a stretch of open field, with only three or four houses. The site slopes toward the south so gently as to appear flat, but is high enough above the creek on the southeast for surface drainage; in fact it is possibly the highest of any land in the vicinity, being almost 16 feet above mean low water. The soil is heavy, but not impervious. The water level

located in the building. The tops of the circular tanks are placed at the ground level. The ground-water plane varies from 6 inches below the surface to 3 feet. It is felt that no trouble will arise from the presence of ground water unless it reaches an elevation sufficiently high to cause the tanks to overflow.

A special effort has been made to locate the tanks in such a way that the possibility of this occurring has been reduced to a minimum. The lines of farm drain tile are located 16 inches below the surface of the ground. These are surrounded by broken stone of 12-inch width and 10-inch depth.

Under the original plan, the streets were not to be improved with permanent road material. This decision was reached on account of the scarcity of all building material in this locality. Since the signing of the armistice has relieved somewhat the heavy demands for building material, it has been decided to surface with gravel the east and west streets connecting with Deep Creek Boulevard which is the main road leading to Portsmouth. This gravel surface is to be 8 feet in width and 9 inches in depth. The sidewalks are all to be constructed of gravel.

The houses of this project have been so designed from one five-room plan type, that they present four different elevations: three for the single-house type and one for double houses. The single types are somewhat modified as to porches to vary the design still further. Viewing the houses along the streets, they present a very interesting appearance though possibly a little unrestful because of the variety of the roof lines. Had the houses been so grouped as to present a greater number of houses with similar roofs, the effect would have been improved. The colors selected for the finish of these houses are in the main satisfactory though possibly a little dark in shade, but in their entirety they look well, being relieved by reason of the few houses which have been painted white and by the white of the blinds and porches.

As already stated, but a single plan type was adopted by the corporation—a plan as suitable for

detached as for semidetached houses. This plan provides for a chimney in the kitchen, back of the stairs, stairs with winders at the top and ample space at the foot of the stairs. In the semidetached houses the chimney is in the center wall of the building. Most of these houses were constructed in this way, but some were built in error with two chimneys instead of one and with stairs too far forward.

The single house has a door leading from the kitchen to the living room, while the semidetached houses have a door between the kitchen and the rear room on the first floor. An improvement might have been made if in every case there had been an opening between the kitchen and front room, for ventilation as well as to give direct access to the kitchen without passing through the rear room. Then, if occasion demanded, the rear room might have privacy as a bedroom. In this plan it would have been possible to enter the house at the foot of the stairs, and by walling off the stairs from the living room this room could be made private.

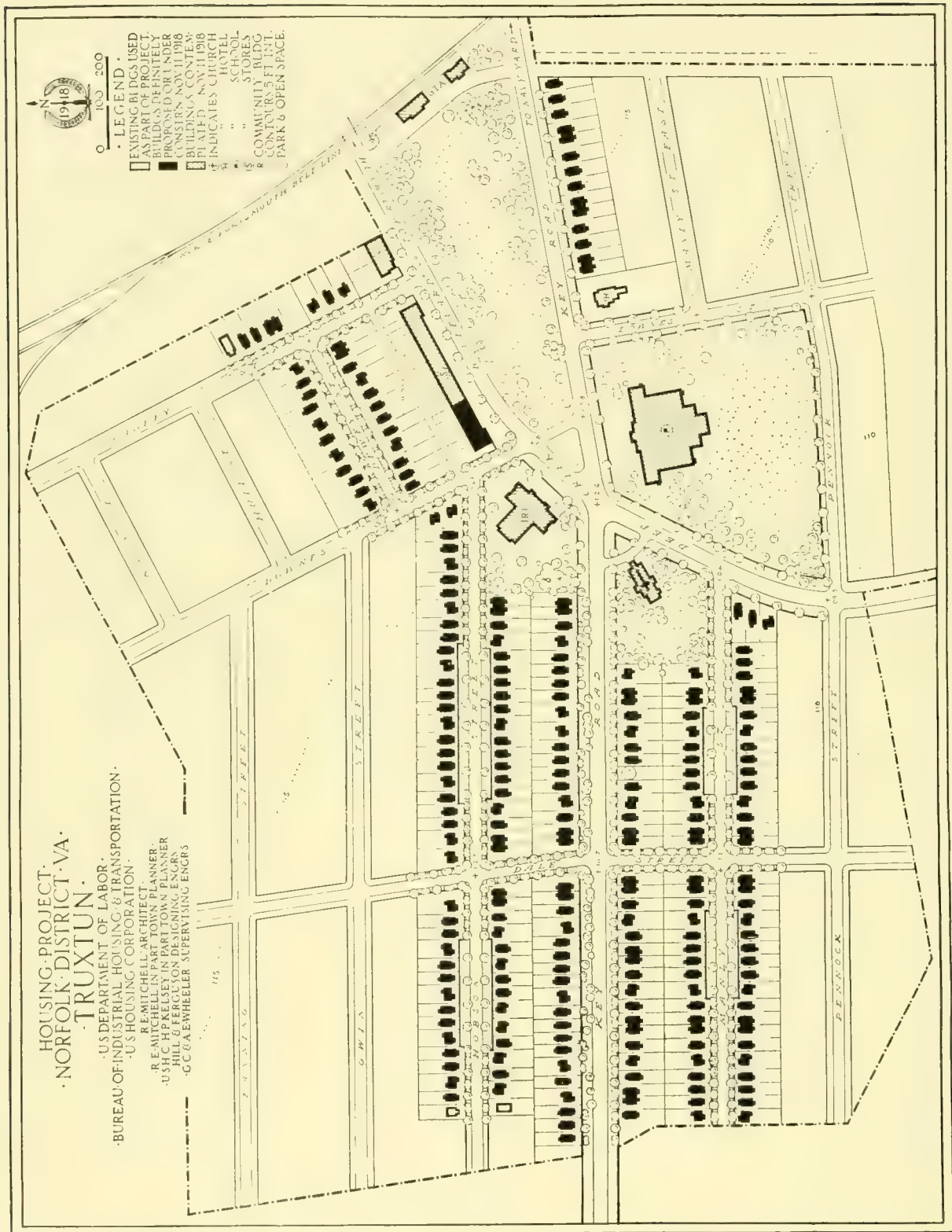
Where dormers occur, a heightening of their roofs would have improved ventilation in the room without disturbing the design of the house.

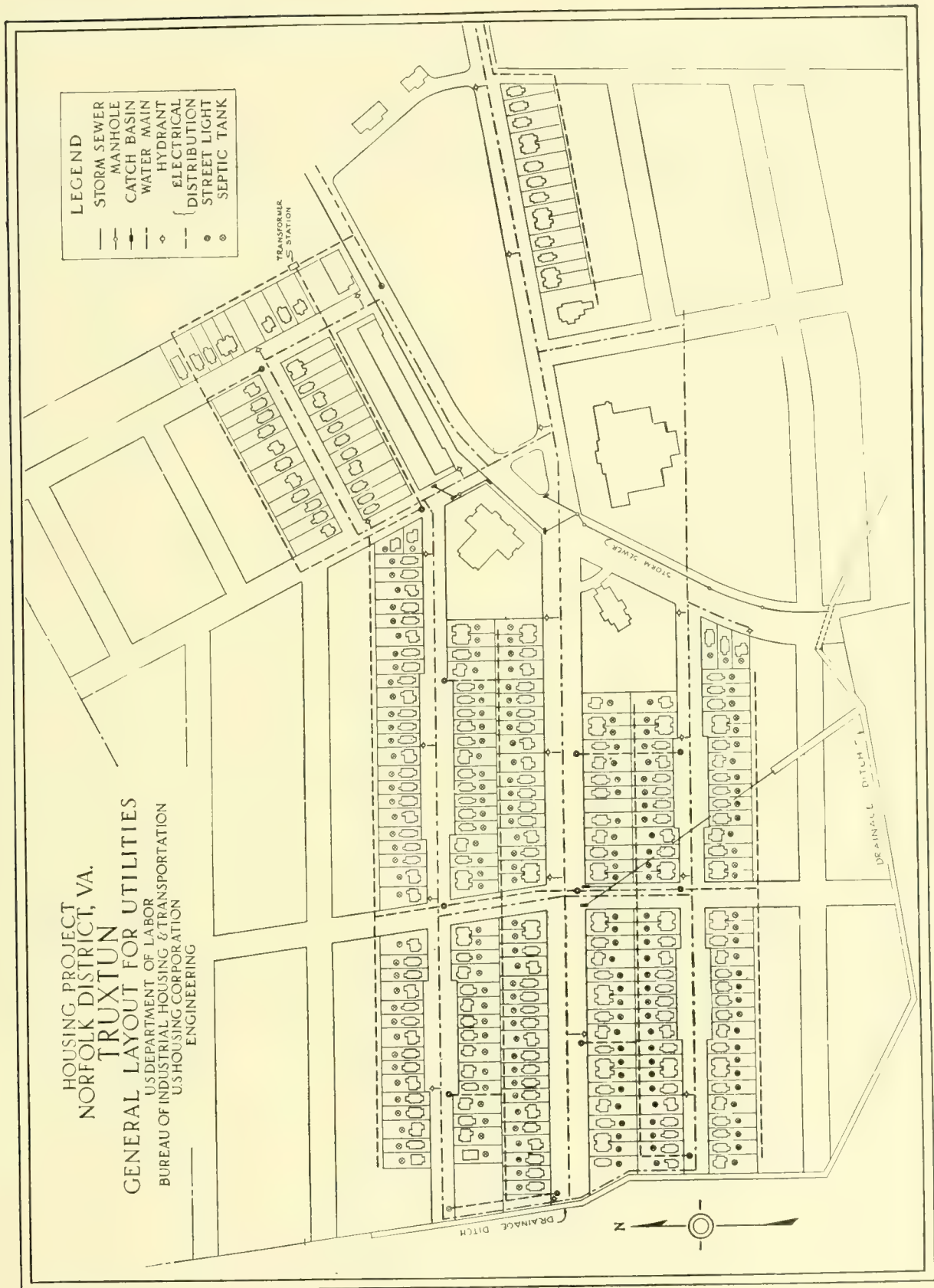
The general construction of the houses, though inexpensive, is good. The foundations are constructed with piers, between which are 4-inch brick curtain walls, giving on the outside the appearance of a continuous foundation.

Instead of using the No. 4 quality siding, which, as it comes from the mill, is about 25 per cent waste and full of knots, it would have been better to have used No. 2 siding, which has but little waste and fewer knots. What was saved in original cost of lumber was generally more than made up in labor and in loss of material.

In these houses there is no basin in the bathrooms and no provision was made for hot-water supply, the latter omission specially being questionable.

The finished houses and the development as a whole are noteworthy as being of high class for their purpose of housing the colored families of the district, but still, with careful avoidance of undesirable expense.





PENSACOLA, FLA. (PROJECT NO. 60).

Area planned: 35.30 acres. Housing planned: Detached houses, 135 families; dormitories, 50 persons.

(Project discontinued. For further information see tables, Chap. IX.)

The Navy Aeronautic Station at Pensacola is in a Government reservation of some thousands of acres on Pensacola Bay, $6\frac{1}{2}$ miles by trolley from Pensacola, a city of 30,000 inhabitants.

Preliminary investigations were made by the Housing Corporation in April, 1918. At that time over 3,000 men were employed at the station, of whom about 1,000 were civilians, and the number was rapidly increasing. The housing accommodations at Pensacola were poor and the journey from the city to the naval station was long, and there were no houses available nearer the station. Nevertheless, as the conditions were worse at other naval stations, action was postponed.

On September 24, 1918, the work was taken up again. Alternative sites were discussed. A site was chosen and the work of surveying and clearing the ground started at once. About this time the epidemic of influenza broke out, and was so severe at Pensacola that no laborers could be had for about 30 days. In the meantime the plans had been completed in detail, and work was beginning when with the signing of the armistice the project was abandoned.

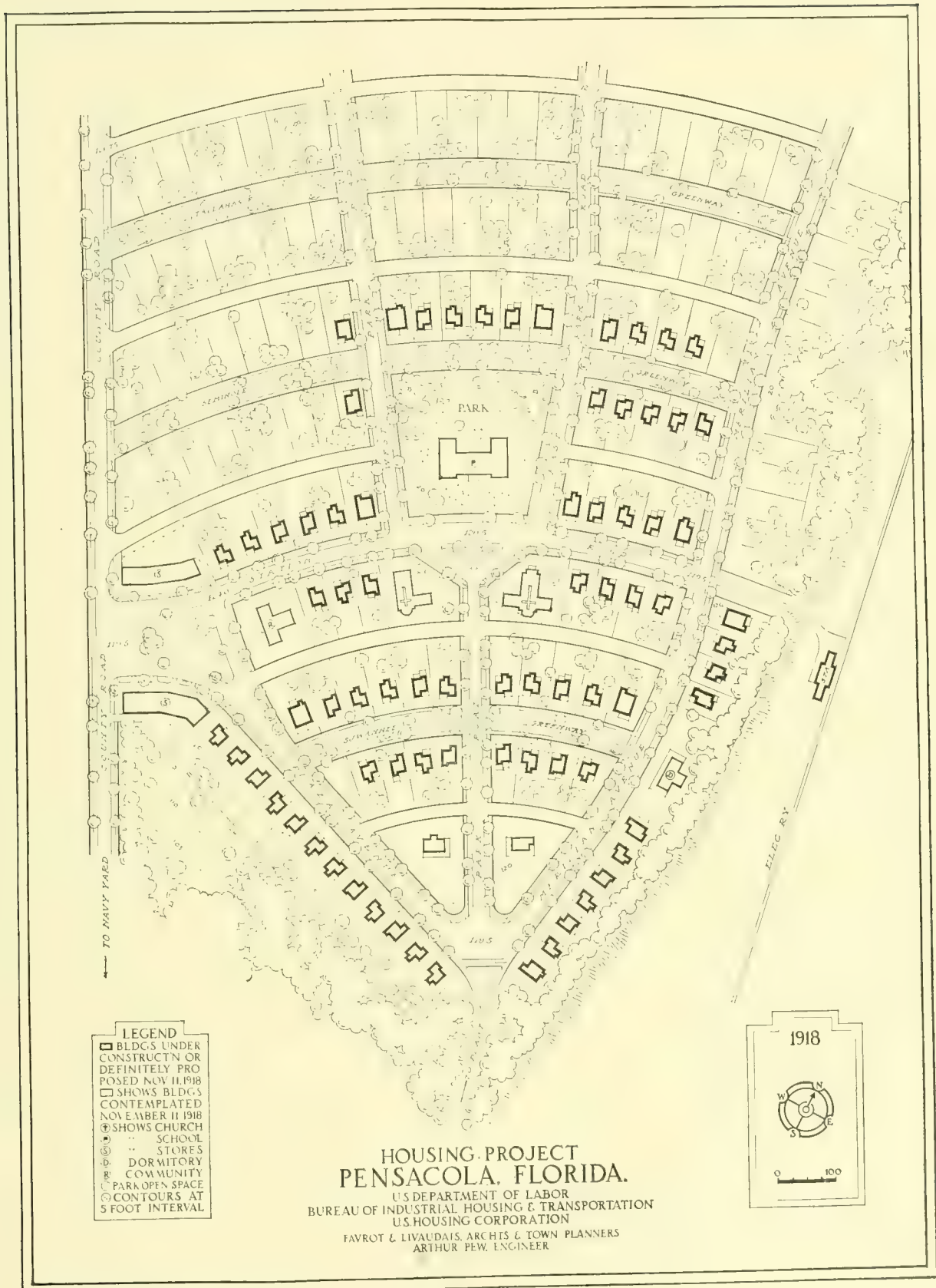
The chosen site was on the naval reservation, half a mile north of the naval station, on well-drained sandy ground 18 to 24 feet above high tide. Along the west side of the site it is proposed to build a concrete road carrying a trolley line, leading north from the naval station gate to an existing highway and shortening the distance to Pensacola. This road would be unshaded, at least for a long time to come, and generally undesirable as a street on which to face houses. On the east of the site is the steep bank of a shallow tidal basin. At the foot of this bank runs the railroad from Pensacola

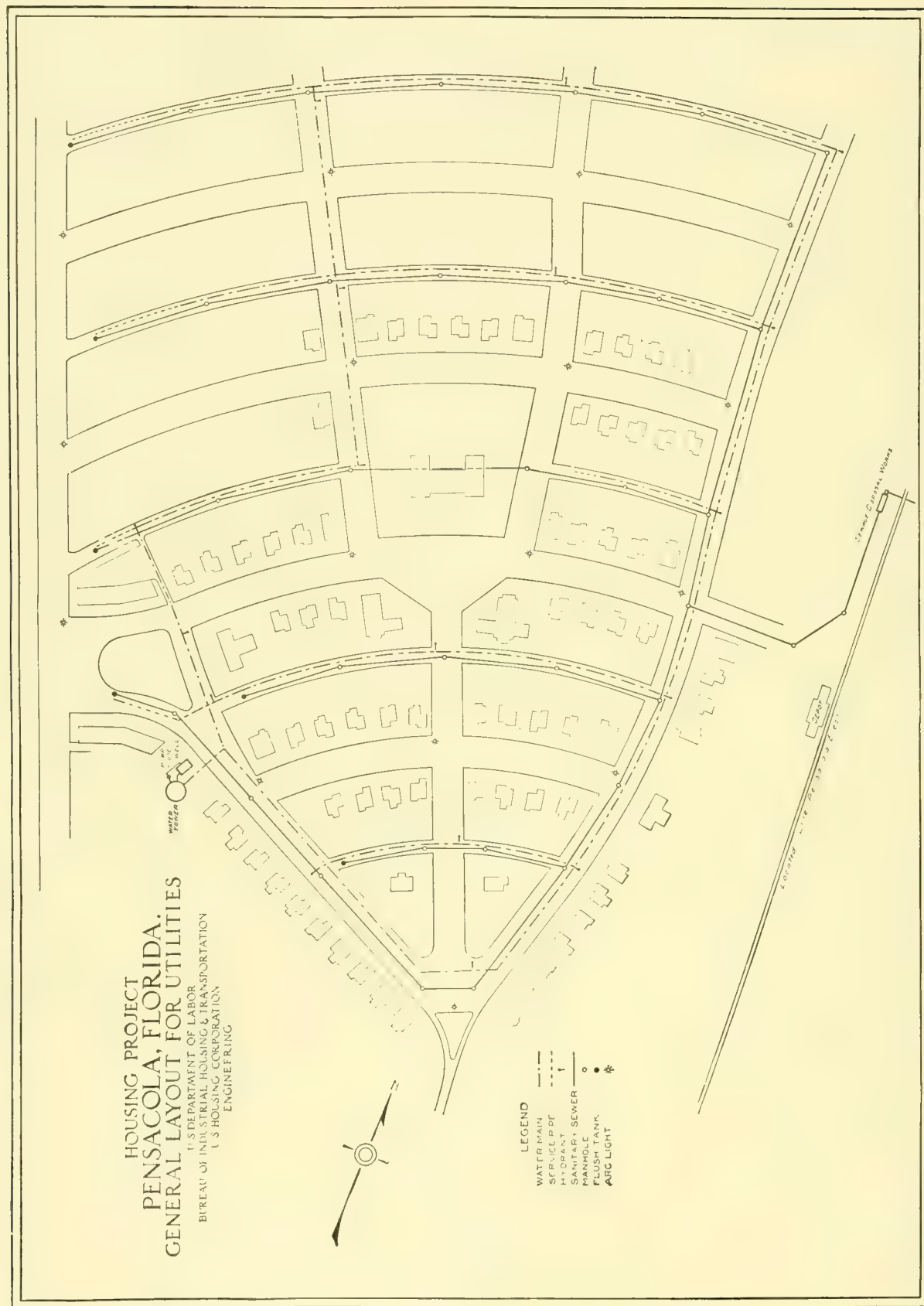
to the naval station, and in the future there might be a passenger station serving the site on this line. Between the site and the naval station is a little valley, draining out to the east. The large amount of shallow brackish water in the vicinity made the mosquito nuisance a very real consideration, but it was believed that with the careful and systematic control which could be exercised by the Navy Department this could be reduced to a point where there would be little or no danger of malaria and little annoyance.

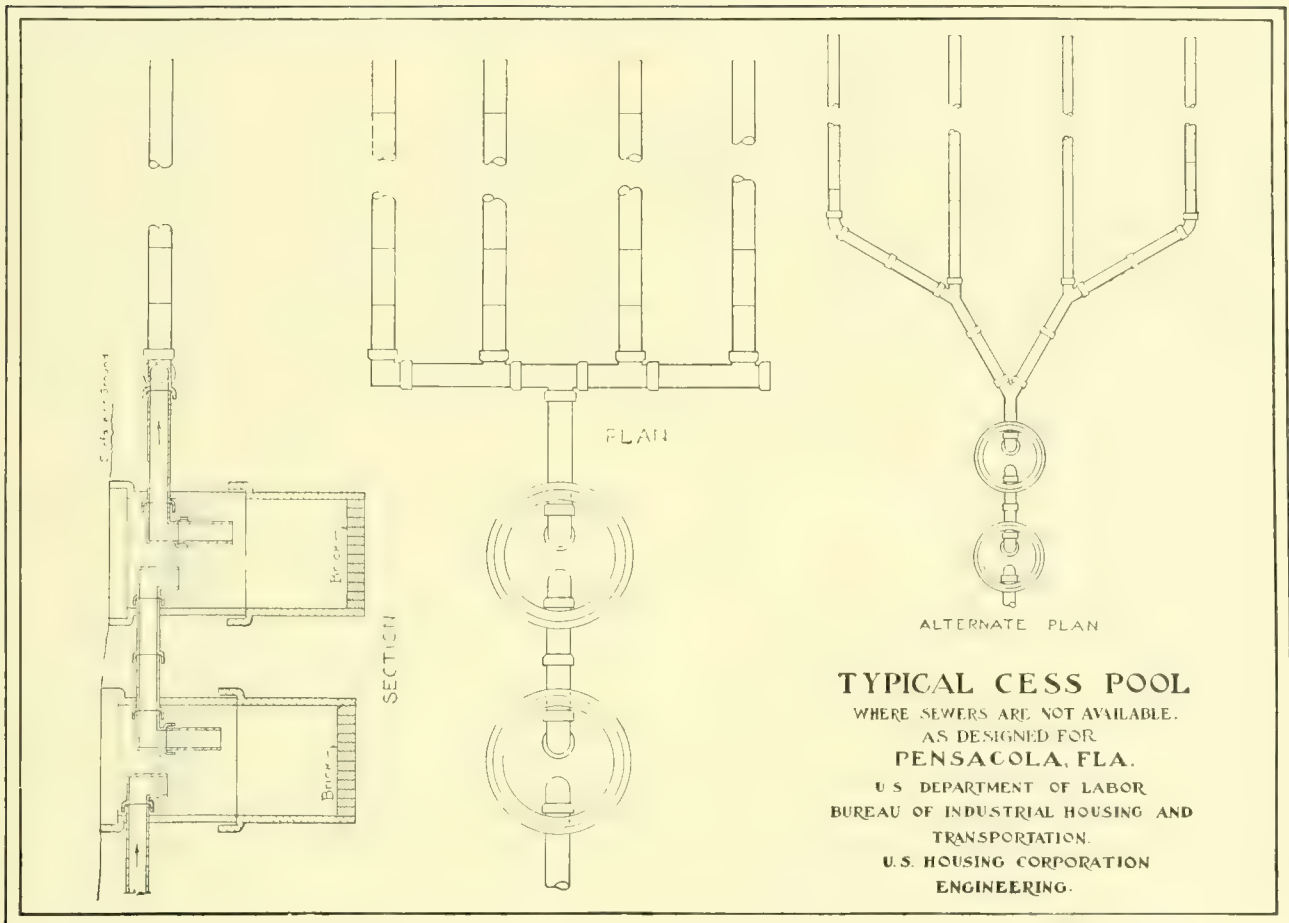
The resultant triangular shape of the site and the obvious lines of traffic suggested the layout of the street system. There is a store center on the concrete road, through which all wheeled traffic would naturally pass. Foot traffic tends to the south part of the triangle and thence by a footpath across the valley to the naval station. An open center is provided in the development, with space for churches and a school. The dormitory, with space for additions, is placed where the foot traffic to it from the station is not thrown very much through the rest of the development.

An unusual feature of the design is the use of "Greenways." Shade is very desirable here, land is plenty, there are some existing trees which should be saved, and there is very little wheeled traffic. It seemed desirable under these circumstances, on the short, purely residential streets, to face the houses upon broad spaces of trees and ground cover, with footpaths only for access, and to build behind the houses narrow roads for service traffic.

The houses were to be of the low, spreading, bungalow type used also at Charleston, S. C., and New Orleans.







PERTH AMBOY, N. J. (PROJECT NO. 471).

Area planned: 6.57 acres. Permanent housing planned: Detached two-flat houses, 4 families; row two-flat houses, 152 families; total, 156 families.

(Project discontinued. For further information see tables, Chap. IX.)

Perth Amboy, N. J., is located about 25 miles from New York City at the intersection of the Raritan River and Staten Island Sound. The population in 1910 was 32,000 and in 1918 was estimated from 45,000 to 50,000. A very large portion of the population is foreign born, from middle and southern Europe.

Besides the great munitions plants in the neighborhood of South Amboy, which were to be accommodated by the temporary housing at Ernston, there were about 15 manufacturing companies in or near Perth Amboy which were doing from 50 to 100 per cent war work, such as the American Smelting & Refining Co., Barber Asphalt Co., Cheseborough Manufacturing Co., C. Pardee Works, Raritan Copper Works, Standard Underground Cable Co. The number of employees in 1915 was about 7,800. This had increased to 13,000 and the further increase needed was about 3,000.

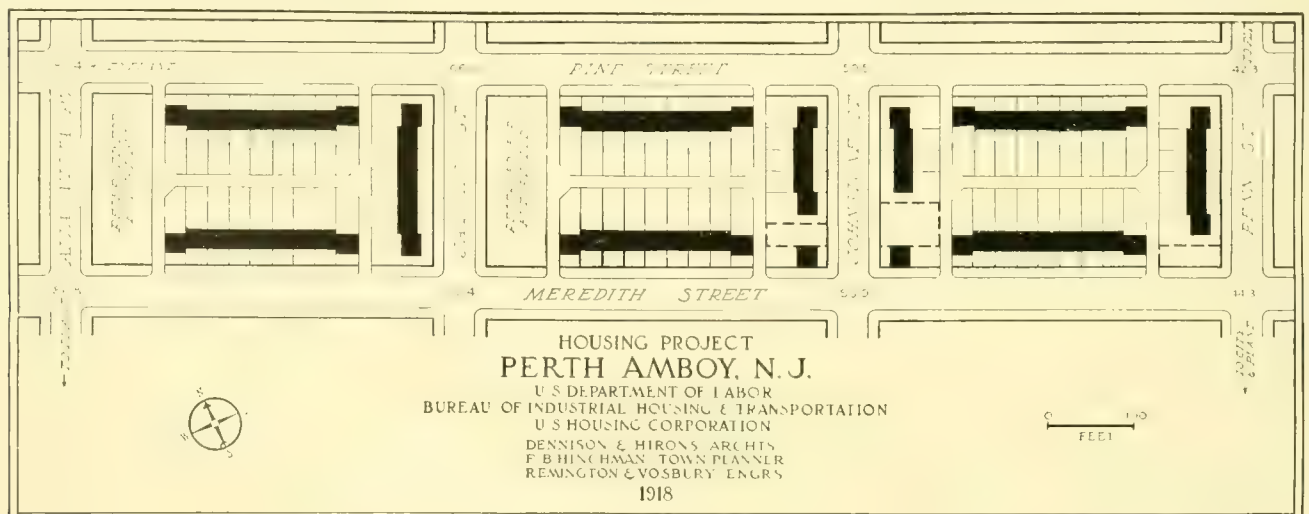
At the time of preliminary investigation, every house and boarding house in the vicinity of Perth Amboy was filled to capacity and many houses had three or four beds in a room which were occupied by both day and night shifts. An unusually high percentage of the workmen in these plants could afford only very low rates.

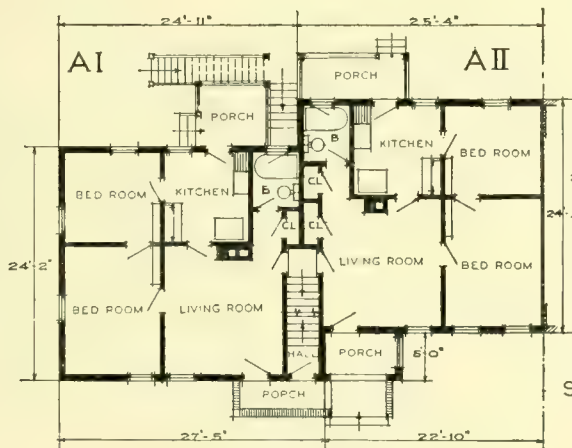
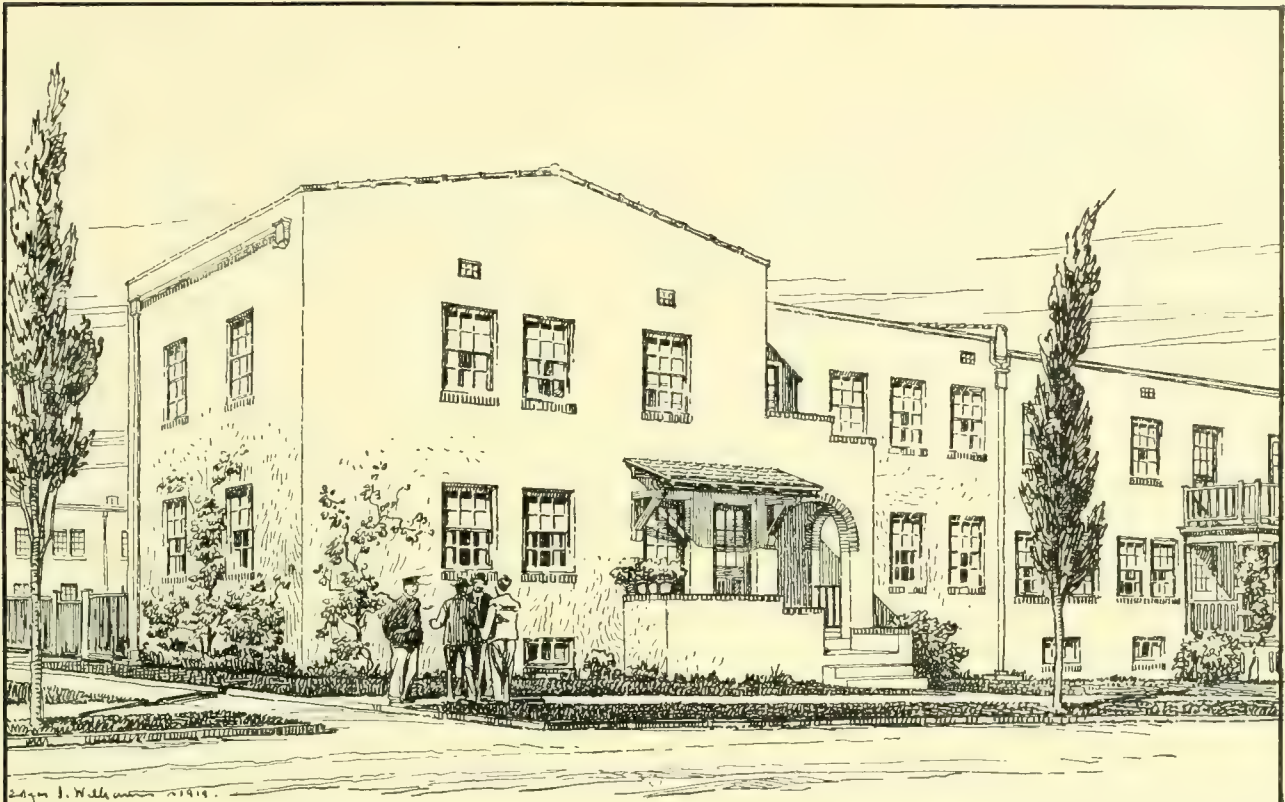
The housing needed was largely for common labor, but to some extent also for foremen and better paid workers. Two sites were chosen. The first, known as the Arnold tract, is located in the northern part of the city. Upon this it was proposed to construct two-flat four-room dwellings in rows, of frame construction, and brick apartment buildings with five-room apartments. The city park occupies a little valley to the north of the site. This is unimproved except that a little had

been leveled for a playground. Much of the "park" was a dump. The Pennsylvania Railroad is at the foot of the hill below. The locality generally is occupied by a poor grade of houses occupied by common labor. Land in Perth Amboy is expensive because so much is of a clay valuable for terra cotta and because the location of the clay beds is such that a bad congestion is created.

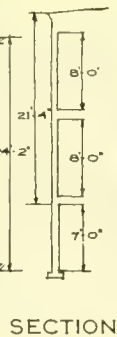
The other site is located partly on private land and partly on Government property at the Government Ordnance Works between Perth Amboy and New Brunswick. On this site it was proposed to construct two temporary dormitories for men and two for women, with cafeteria, and 20 six-room houses of bungalow type. The soil throughout this district is clay and gravel. Both sites are fairly level. The Arnold tract within the city of Perth Amboy is within reasonable distance of schools, churches, stores, and amusement facilities. The other tract is located on an electric railway line.

Because the land available for the row dwellings was in a neighborhood of congested development and high price, a permanent construction seemed advisable, since the community promised to continue demand for houses after the war activities ceased. Terra cotta, which was available in quantities in the neighborhood, was adopted for outside and party walls. Flat composition roofs were used, plumbing was reduced to a minimum, heating by stoves adopted, and all features which might have given character to the exterior were necessarily sacrificed to keep the costs and the resulting rents to the minimum. The dwellings were well arranged and offered entirely adequate accommodations for the class of prospective tenants.

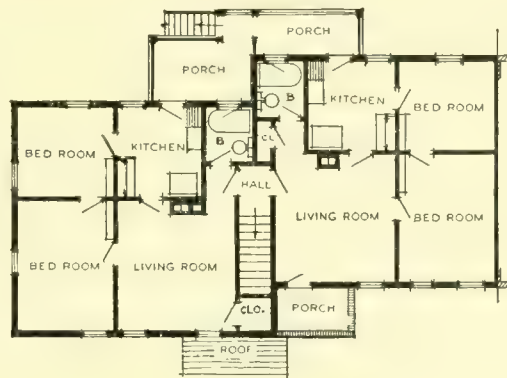




FIRST FLOOR PLAN



SECTION



SECOND FLOOR PLAN

END COMBINATION ROW TWO FLAT HOUSES TYPES AI AND AII

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT PERTH AMBOY N J

ARCHITECTS

DENNISON AND HIRONS

PHILADELPHIA DISTRICT, PA.

Philadelphia, third in population of the cities of the country, with great and varied activities, turned a large proportion of its industrial powers to winning the war. The influx of new workers, and the collection of workers closely around the larger plants, brought the use of housing in many districts to the saturation point. One of these districts was toward the southern limits of the city in the vicinity of the great League Island Navy Yard. Another was 8 or 10 miles northeast of the city's center and near the Frankford Arsenal, the Tacony Ordnance Co., and the Tacony Steel Co. Works.

League Island lies at the south end of Broad Street 4 miles south of the City Hall. The older and central portion of the navy yard was used in repair work and in the construction of small boats. At the east end was a new naval aircraft factory employing 1,400 men. At the west end new dry docks, piers, and shipways for the construction and repair of the largest ships were under way, one ship to cost \$19,000,000 being under construction. Before our entry into the war, the number of employees was 2,600. By March 21, 1918, there were 7,288. In 1919, 15,000 were expected. Single men were sufficiently provided for, both on the Island and elsewhere, but there was an utter lack of houses for men with families within one hour and a half by trolley of the navy yard. Probably a few hundred houses could be found for sale, but all were rented. Many houses occupied formerly by one family now had one family to a room. The percentage of labor turnover at League Island was large and was complicated by the fact that the Hog Island and Cramp shipyards near by offered very high wages and were near where many of the men lived. A large majority lived 10 miles from the navy yard, though perhaps one-third of them lived between Oregon Avenue, one and one-half miles away, and a line one mile north of it.

For the partial relief of the transportation difficulty of the League Island Navy Yard, and also to help the Baldwin, Eddystone, and Westinghouse war industrial plants between Chester and Philadelphia, the Housing Corporation advanced \$1,740,000 to the Philadelphia Rapid Transit Co. for 90 cars, additional substation capacity, additional direct current feeders, and tracks.

For the benefit of the navy yard employees, the Housing Corporation made plans for two sites. One of 36.5 acres lay along Oregon Avenue, and was 1½ miles north of the yard, all the land between the two being very low and needing heavy filling. The site selected is a portion where filling had been completed, just east of Broad Street, the main thoroughfare, leading across the lowland to the navy yard. A recently improved trolley line leads through Broad Street to the yard. This development was carried through substantially as planned, and completed after the signing of the armistice. The other site for navy yard employees comprised an area of 94 acres at Penrose Avenue and Hoyt Street about 1 mile northwest of the yard.

Tacony had two industrial regions, both on the Delaware River in the northeast part of Philadelphia, some 8 miles from the City Hall. The chief plant of one region was the Frankford Arsenal, with 5,400 present employees and 2,000 men expected as fast as they could be secured. The two industries comprising the other were the Tacony Ordnance Co. and the Tacony Steel Co., together employing 1,100 men and needing 350 additional. To improve transportation to the Frankford Arsenal the Housing Corporation advanced to the Philadelphia Rapid Transit Co. \$554,007 for track extensions, power supply, and 20 new cars. For the employees of these two regions one housing site was selected by the Housing Corporation, a tract of 16.5 acres about three-quarters of a mile from the ordnance company and the steel company plants. This project was abandoned on the signing of the armistice.

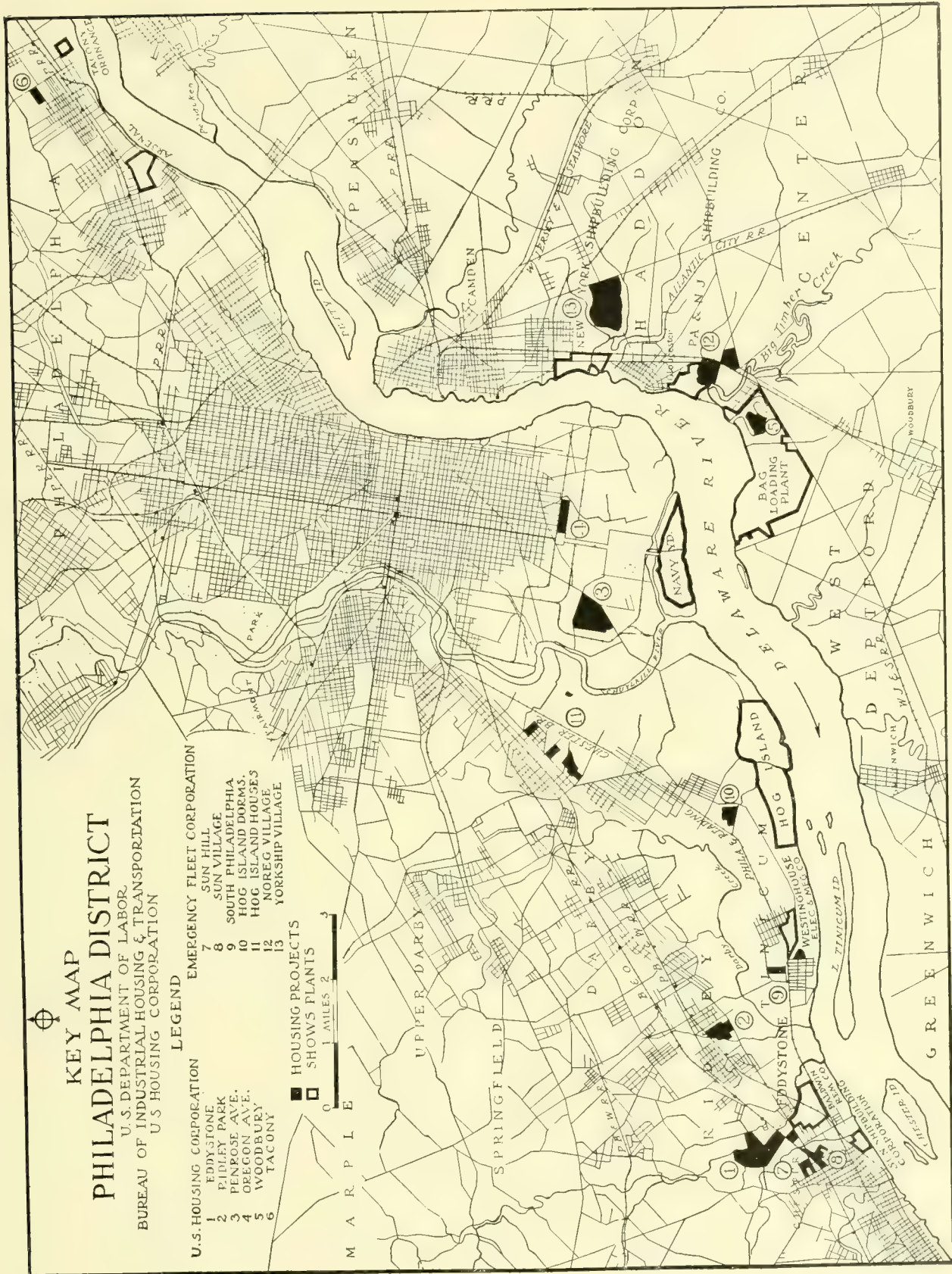
Oregon Avenue Site (Project No. 503).

Area planned: 36.58 acres. Housing planned: Row houses, 696 families.

Housing constructed: Row houses, 650 families.

(For further information see tables, Chap. IX.)

The League Island Navy Yard is at the south end of Broad Street, and the built-up portion of the city in that direction stops with Oregon Avenue. South of Oregon Avenue the land is generally too low for building unless filled, but immediately south of Oregon Avenue it had already been filled to the



extent necessary. There is a double-track car line on Broad Street passing through the plaza at the intersection of Broad Street and Oregon Avenue to the gate of the navy yard. The proposed subway on Broad Street will have stations both at the plaza and the navy yard. The tract selected was a logical one and was liked by the workmen consulted.

Adjacent to and west of this site is located the plaza, a small park which has been dedicated and improved by the city. There is also a large park, which the city has begun to fill and improve, located immediately north of League Island and approximately 1 mile from the housing development.

Since the site is within the city and adjacent to a section which has been entirely built up, stores, churches, and amusement facilities are to be obtained at no great distance, but a school was needed. The surrounding developments are of a very poor class. The existing houses are all constructed upon very shallow lots and in long rows. The conditions are not ideal, but the site as selected was the best available under the circumstances.

The Oregon Avenue site being a former dump, the soil is mostly ashes and trash with some clay at its east end. Good soil for lawn areas and tree pits had to be supplied.

The new street arrangement is based on Broad Street although not actually touching it, Oregon Avenue and Johnston Avenue being east and west streets at right angles to it. The manner of subdivision departs somewhat from the monotony and stiffness of the usual row-house subdivision. The Philadelphia Bureau of Surveys had made a change in the street arrangement from Oregon Avenue south. It did not object to another change in the blocks lying between the northern and southern street systems provided we kept open and continuous the wide north and south streets of the southern system, namely, Seventh, Darien, Tenth, Marvine, and Thirteenth Streets.

With the opportunity for developing larger tracts than the typical Philadelphia blocks, each space between the wide streets named was worked out as a unit and a series of row houses was made to group around a central open space, minor streets and alleys providing local communication. The central open space of each group was developed as a neighborhood playground.

There are three types of houses in this project. In each case the ground floors have the same plan,

slight variations having been made in the second floor. Some few of the houses (generally end houses) have a third floor with two bedrooms and a storeroom. The plans are all simple and straightforward, and whether the house is 16 feet or 18 feet wide, it is comfortable, the rooms being ample and the appointments complete for the uses of a small family. The heating system is more than adequate in size. In these houses, the cold air return, unlike those in most other projects, is through a register face in the wall instead of one in the floor.

All the houses are built of brick, the face brick being red in color and each has a good sized front porch, under which is the storage for coal. The houses are well constructed throughout. The outside walls are furred.

The designs of the houses are good, there being a sufficient number of different exteriors to avoid the monotony of appearance that is usual in an unbroken row of houses.

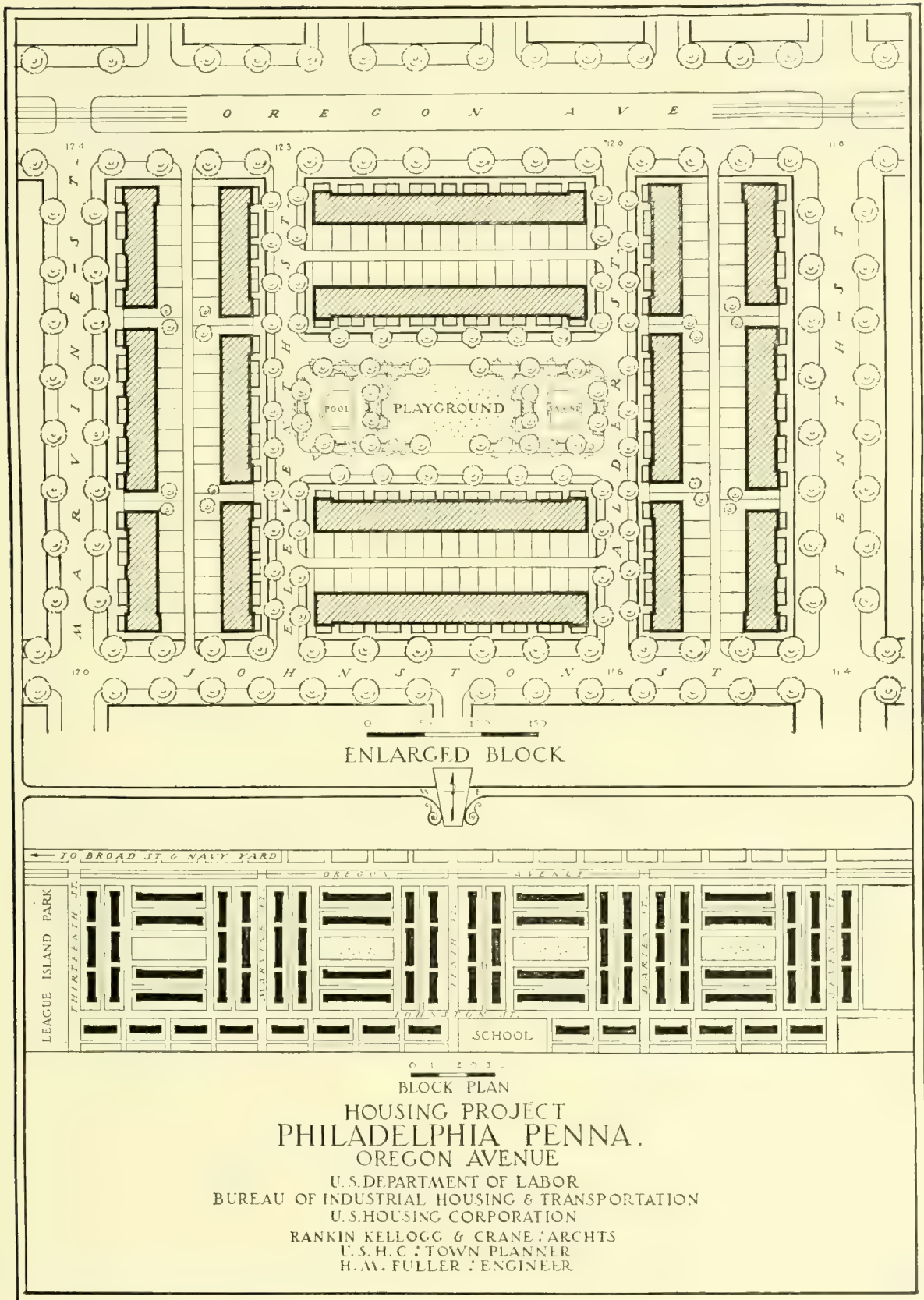
While these buildings are very much better than most of their kind, they do not compare in appearance with distinguished examples of colonial houses, which are to be found in groups, hidden away in the older sections of Philadelphia. A study of the exterior design of these old houses would be of value to those who contemplate the erection of buildings of this kind.

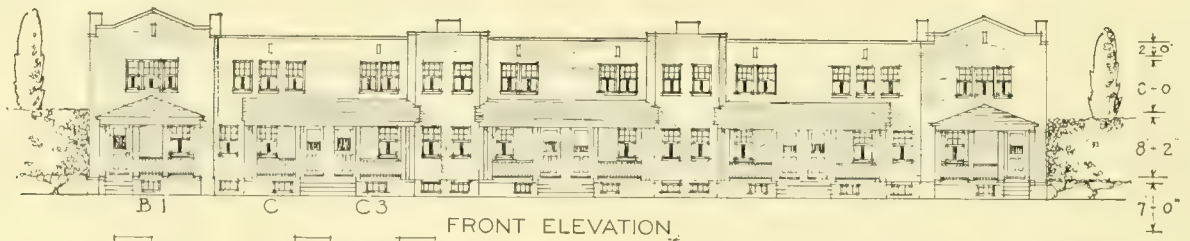
Penrose Avenue Site (Project No. 503a).

Area planned: 94.21 acres. Housing planned: Semidetached houses, 68 families; row houses, 959 families; apartments, 78 families; total, 1,105 families. Project discontinued (For further information see tables, Chap. IX.)

The Penrose Avenue site is within walking distance of the navy yard but was planned also to have street car connections along Pattison Avenue. These already extend northeast to the city proper. The land is higher than the surrounding property, being on an average about 25 feet above mean tide level, requiring no hauling in of material for fill, and, being less expensive than the Oregon Avenue site, it is possible to develop it less intensively. Utility lines could be laid without difficulty.

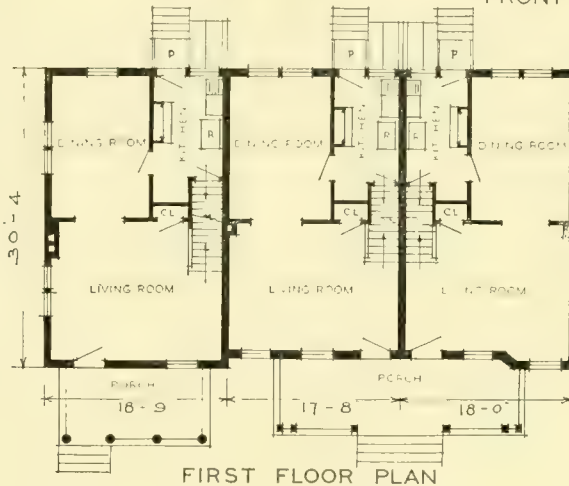
This is a more rural neighborhood than the Oregon Avenue tract, the land somewhat rolling, with a rich black topsoil underlaid with clay. Owing to the isolation from the built-up portion of the city, schools, stores, and local amusement facilities will have to be provided. The site is just west of Penrose Avenue, which is a diagonal thoroughfare



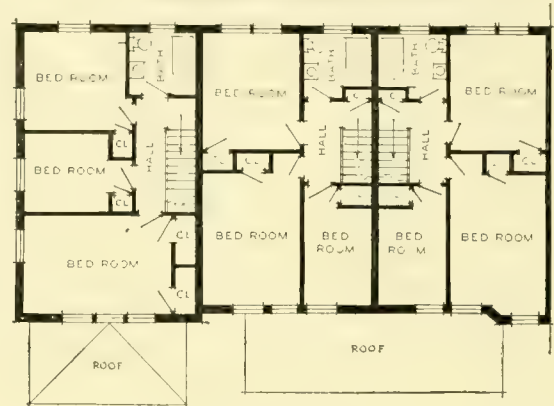


FRONT ELEVATION

SCALE 10 20 30 40 50 FEET



FIRST FLOOR PLAN



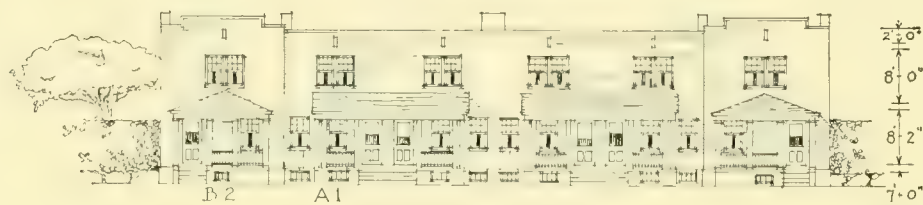
SECOND FLOOR PLAN

SIX ROOM ROW HOUSES

GROUP K2

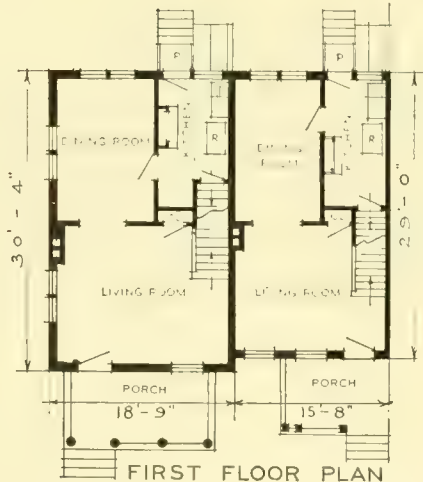
TYPES B1-C-C3

SCALE 5 10 15 20 25 FEET

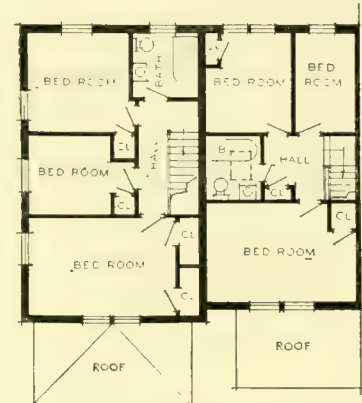


FRONT ELEVATION

SCALE 10 20 30 40 50 FEET



FIRST FLOOR PLAN



SECOND FLOOR PLAN

SIX ROOM ROW HOUSES

GROUP S2

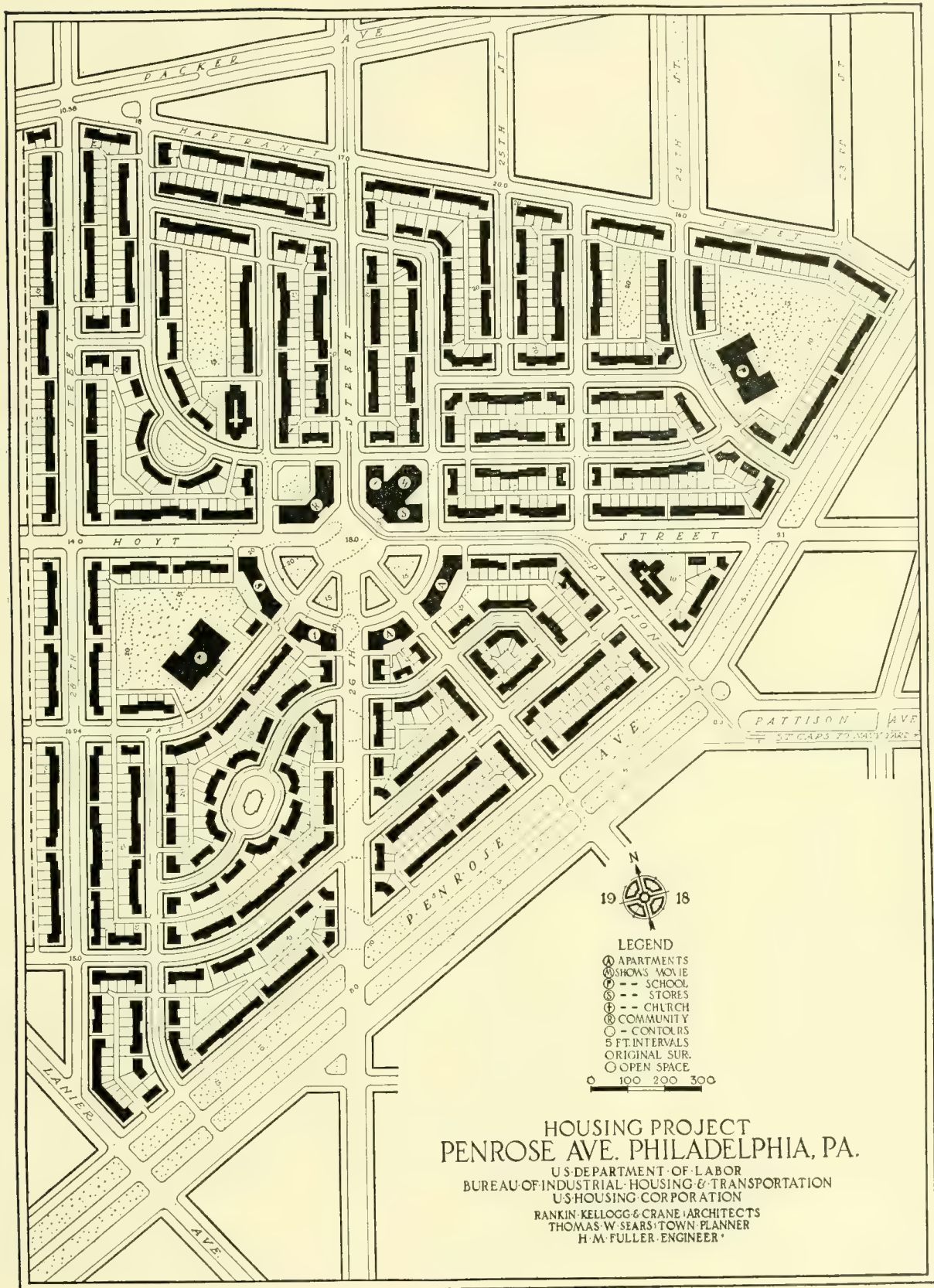
TYPES B2-A1

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT PHILADELPHIA PA

OREGON AVE

ARCHITECTS

RANKIN KELLOGG AND CRANE



leading northeast from the bridge nearest the mouth of the Schuylkill River to and across Broad Street.

The street system is based on Penrose Avenue, which lies along its east and south boundary. Twenty-eighth Street is its westernmost street and Hartranft Street its northern limit. Twenty-sixth Street crossing the center was fixed by the Bureau of Surveys as the north and south axial street, and Hoyt Street the east and west, with the store center at the intersection marked by a semi-circular park. Otherwise than this the corporation was allowed a large freedom in subdividing the tract both as to street location and as to fitting the streets to the ground to save grading. One necessity was the proposed car line running south in Twenty-sixth Street to the store center, then turning toward the navy yard gate by way of Pattison Avenue. The balance of the arrangement was to provide the row houses needed with as good grouping as the space permitted. Two school sites and playgrounds and two small squares affected the street arrangement, as did the use of several enlarged blocks with small interior playgrounds.

The grouping around the square is expressive of the center of a considerable community, which this development would have been when completed. While a number of the minor streets are parallel to the main thoroughfares, three small parks or greens well distributed are made the nuclei for different local arrangements. This diversity in the street

layout gives an interest lacking in a purely rectangular system of streets.

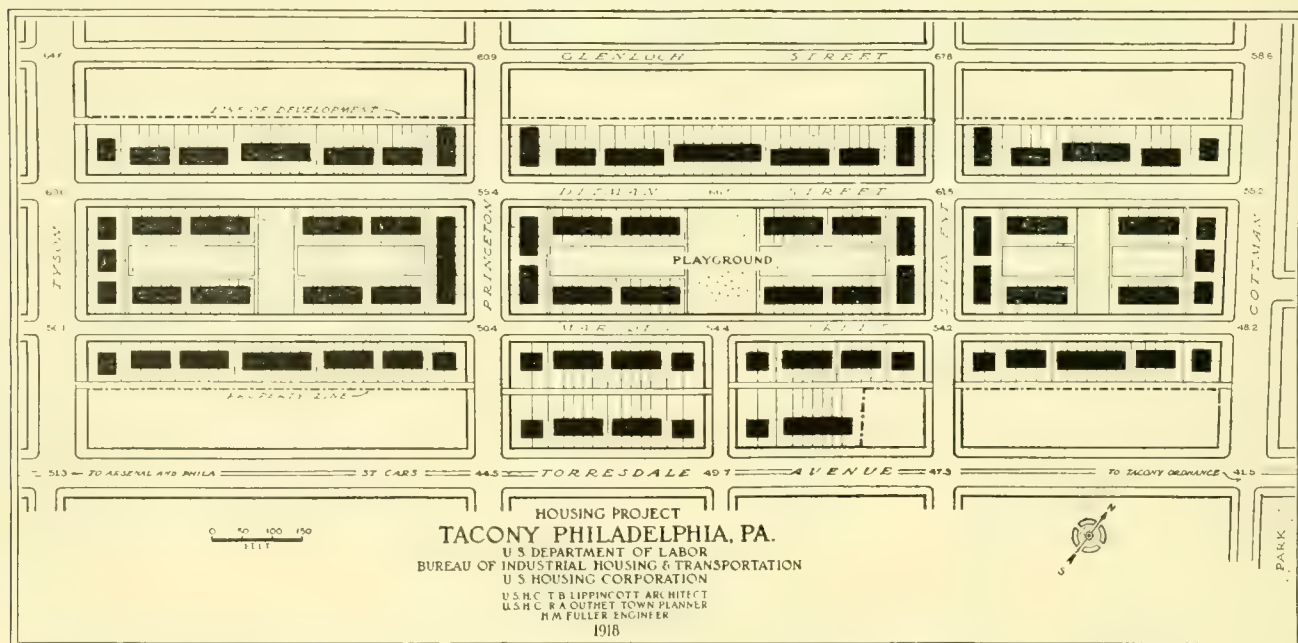
The greens at the store center and the several other small parks, greens, and playgrounds of various classes provide a considerable opportunity for recreation.

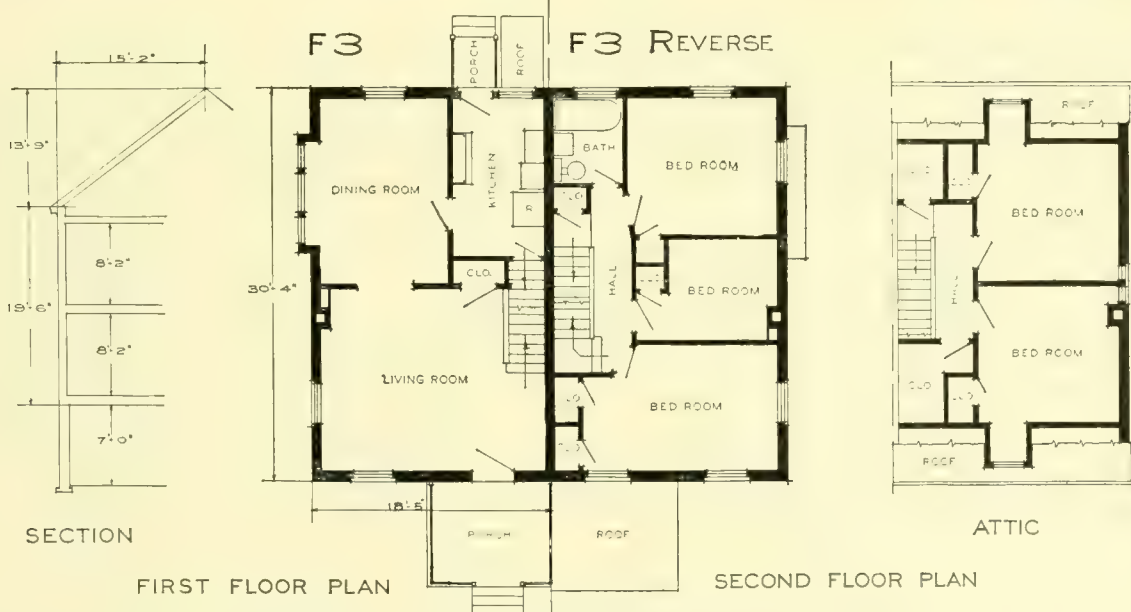
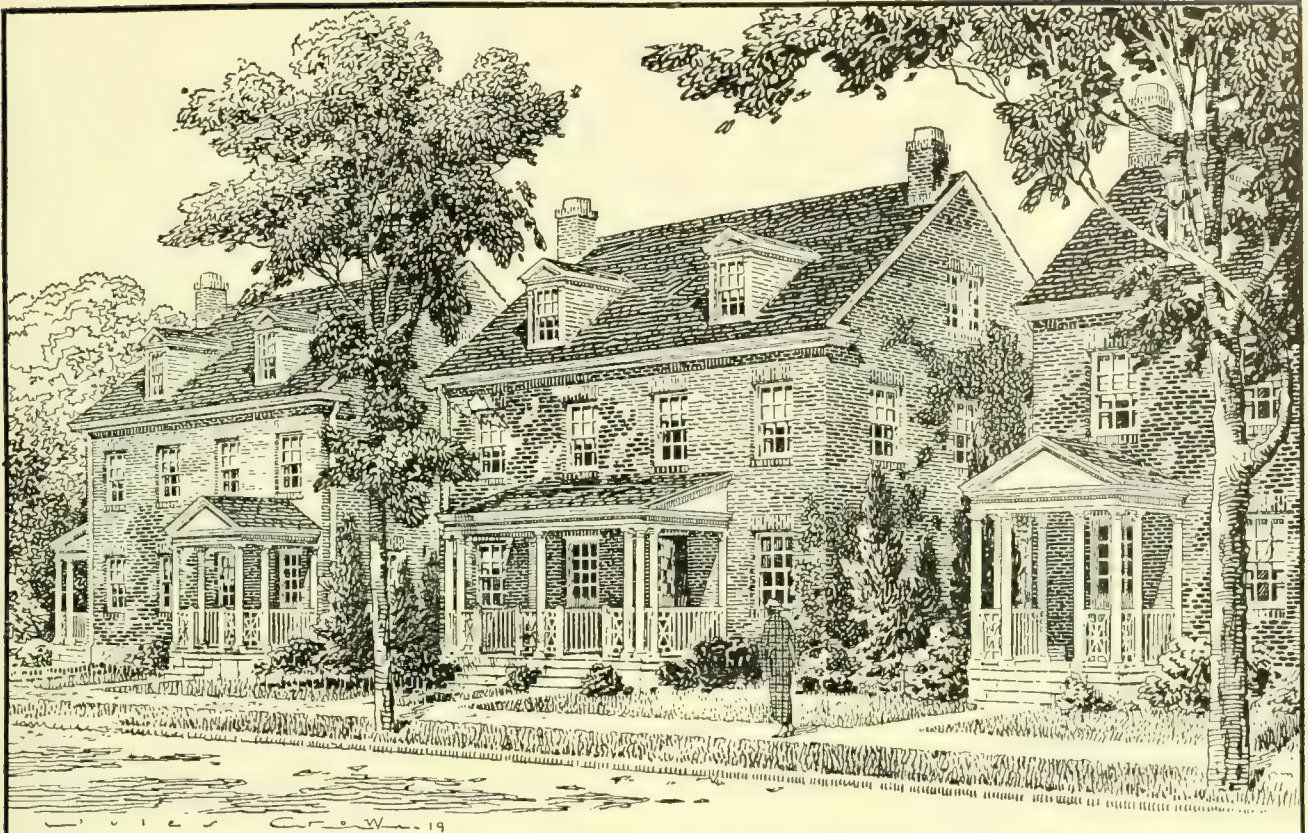
Tacony (Project No. 1536).

Area planned: 16.55 acres. Housing planned: Semidetached houses, 26 families; row houses, 242 families; total, 268 families. Project discontinued.

(For further information see tables, Chap. IX.)

The Tacony site is within walking distance of the Tacony Steel & Ordnance Works. It is just north of and contiguous with the village of Tacony and west of a main thoroughfare, Torresdale Avenue, with a street car line giving good transportation to the Frankford Arsenal $2\frac{1}{2}$ miles away, and to the center of Philadelphia. The land is high, slightly rolling, and well drained. The soil is clay for a depth of 4 or 5 feet, overlying sand and gravel. All the necessary utility mains were in Torresdale Avenue. Very good schools, churches, stores, and amusement facilities are located in Tacony adjacent to the development. An excellent city park four blocks in extent lies diagonally opposite the site at the intersection of the principal avenues. No suitable land was to be found near the arsenal except where a separate sewer outfall would be needed and at a prohibitive price.





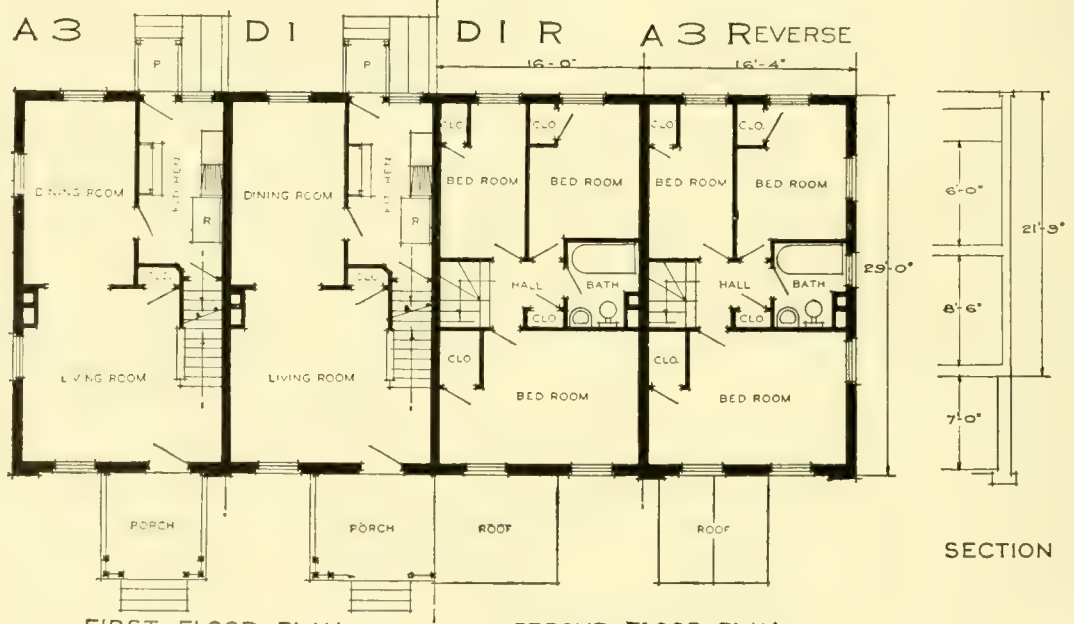
EIGHT ROOM SEMI-DETACHED HOUSES TYPES F3 AND F3 R

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT TACONY PA

ARCHITECT THOMAS B LIPPINCOTT U S H C



SCALE 5 10 15 20 25 FEET



FIRST FLOOR PLAN

SECOND FLOOR PLAN

SIX ROOM ROW HOUSES

TYPES A3 AND D1

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT TACONY PA

ARCHITECT THOMAS B LIPPINCOTT U S H C

The city arteries, Torresdale and Cottman Avenues, control the street layout. The streets already platted in the city plan were adopted unchanged except for the omission of a short block of Friendship Street between Ditman and Marsden Streets. This enabled the previously accepted street profiles in the vicinity of the omitted street to be changed to save grading and made a pleasant variation from the stereotyped street layout. A series of interior playgrounds made an unusual alley system on varying grades necessary.

An interesting house grouping was made by the spacing between buildings and a variety of setbacks. The rolling character of the ground and the heavy street grading made a considerable variety of lot elevations.

The houses, unlike the types already established in the Philadelphia district, were arranged in groups of from two to nine units, and in all cases were only two rooms deep, with ample front and rear yards. This arrangement was warranted by the comparatively cheap land, as was also the saving of land for playgrounds.

There was no demand for stores, as the development is part of an established community.

All the houses are of brick, have simple wood cornices and porches, and are sufficiently varied in design. The flat-roofed groups are relieved by the introduction of semidetached, gabled houses with slate roofs at intervals. The plans are superior to the usual Philadelphia row house plan.



PORT PENN, DEL. (PROJECT NO. 2990).

Areas proposed to be acquired: Site 1, 500 acres; Site 2, 410 acres; Site 3, 478 acres. Areas planned: Site 1, 300 acres; Site 2, 325 acres; Site 3, 372 acres. Minimum housing planned (same for each site): Detached houses, 600 families; dormitories, 3,000 persons. (Greater accommodations than this are shown by the plans and tables.)

(Project discontinued. For further information see tables, Chap. IX.)

In the fall of 1918 the Marlin-Rockwell Loading Co. had under contract a loading plant for heavy aerial bombs, to have a capacity of 5,750 bombs per day, on the Delaware River near the village of Port Penn, 24 miles south from Wilmington. There were ultimately to be eight units employing 3,000 people, half of them women, but at first there were to be four units employing 1,400 people. Railway communication was by a spur from Mount Pleasant, 8½ miles west. The surrounding country in the immediate vicinity could furnish but few possible employees or houses, so that a new town was necessary, with all community facilities, utilities, and open spaces. The ground in the vicinity varied generally from flooded marsh to farm land and woodland 25 feet above mean low water.

The contract date for the completion of the first bomb-loading unit was October, 1918, and the entire plant was to be completed in February, 1919. By September 1 actual construction of the plant had not commenced, though workmen's accommodations were nearly complete. The number of operatives to be employed was uncertain. It was decided to proceed on the assumption of housing 2,000 operatives less what might be recruited or housed in the neighborhood, but to provide land enough to house 3,000 or more. From 50 to 70 per cent of the workers were assumed to be men.

On September 10 the project engineer, the project town planner, and the corporation representative in charge of temporary and especially rapid construction met on the ground, and chose a housing site, proceeding on the assumption of the need of the following accommodations (these assumptions were slightly modified from time to time during the work):

Railroad station, with platform of sufficient length, located on track separate from main track of the plant. Additional spur track near station for delivery of village freight and supplies.

Buildings near railroad station:

- Commissary warehouse and refrigerator.
- Quartermaster's office and repair shop.
- Stable and storage shed for sprinklers.
- Laundry.
- Five-car garage.
- Cold storage.
- Bakery.

Buildings at Civic Center or near by:

- One Y. W. C. A.
- Two Y. M. C. A's.
- One 60-room hotel.
- One retail general store.
- Two semidetached stores with apartments over.
- One community building.
- One pool room and bowling alley.
- One drug store.
- One post office.
- One short-order restaurant.

Dormitories in three groups, 10 buildings in a group:

- Twenty men's dormitories, capacity 100 men in each.
- Ten women's dormitories, capacity 100 women in each.
- Three cafeterias, one at each dormitory group, seating capacity 600.

Houses:

- One hundred executives' houses, six and eight rooms.
- Five hundred bungalows, five and six rooms.

Other buildings:

- One eight-room school.
- Twelve two-car garages at rear of executives' houses of first class.
- Eight five-car garages grouped in housing section.
- One hospital group.
- Hose-reel houses as required.

Since the whole development was for the benefit of an industry that would in all probability cease with the war's end, the buildings and utilities were to be as cheap as consistent with decent living conditions, and everything which would increase speed in construction was especially at a premium in the design.

In the plans prepared, as indicated in the tables, room for greater accommodations than the above was provided for, there being no certainty that the stated figures might not be exceeded.

The site first chosen and approved by the Ordnance authorities was that marked as No. 1 on the key plan. The difficulty here was principally the flat and low ground, which made the sewerage layout difficult, and restricted the site because certain parts practically could not be sewered without an expensive pumping plant. On October 12 the topographic map of the area had been made, the streets, blocks, house sites, and utilities studied, and the layout plan completed with preliminary estimate.

It was then decided, in view of the disastrous explosion which had just taken place at South Amboy, that it would be better to move the town site farther from the plant. A site was chosen

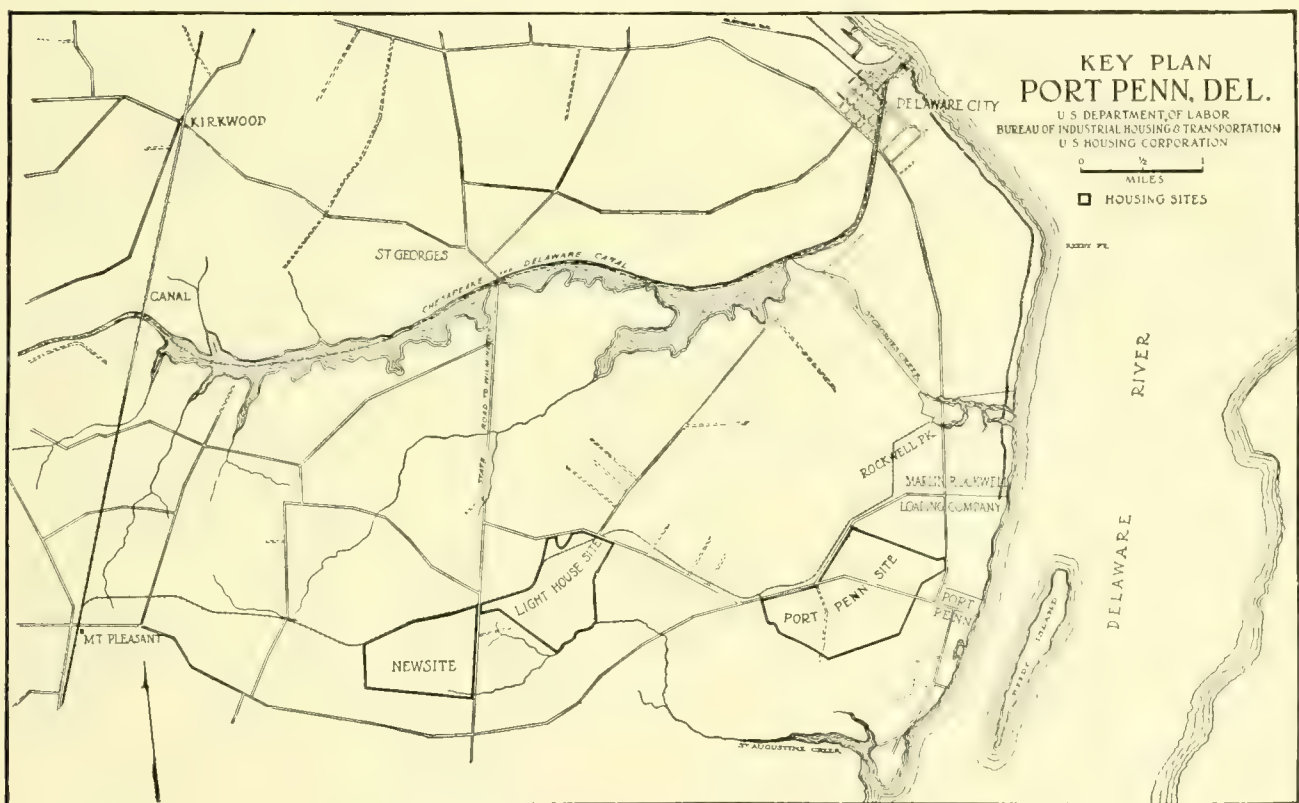
(site 2) reasonably satisfactory to all concerned, though the question was at once raised whether the distance to the plant and the accompanying transportation expense were not too great. In order to save time while this and the question of sewage disposal were being settled, however, the town planner proceeded with the layout plans on the basis of a topographic map which had been begun as soon as the second site was tentatively decided on. On October 21, the second layout plan was finished.

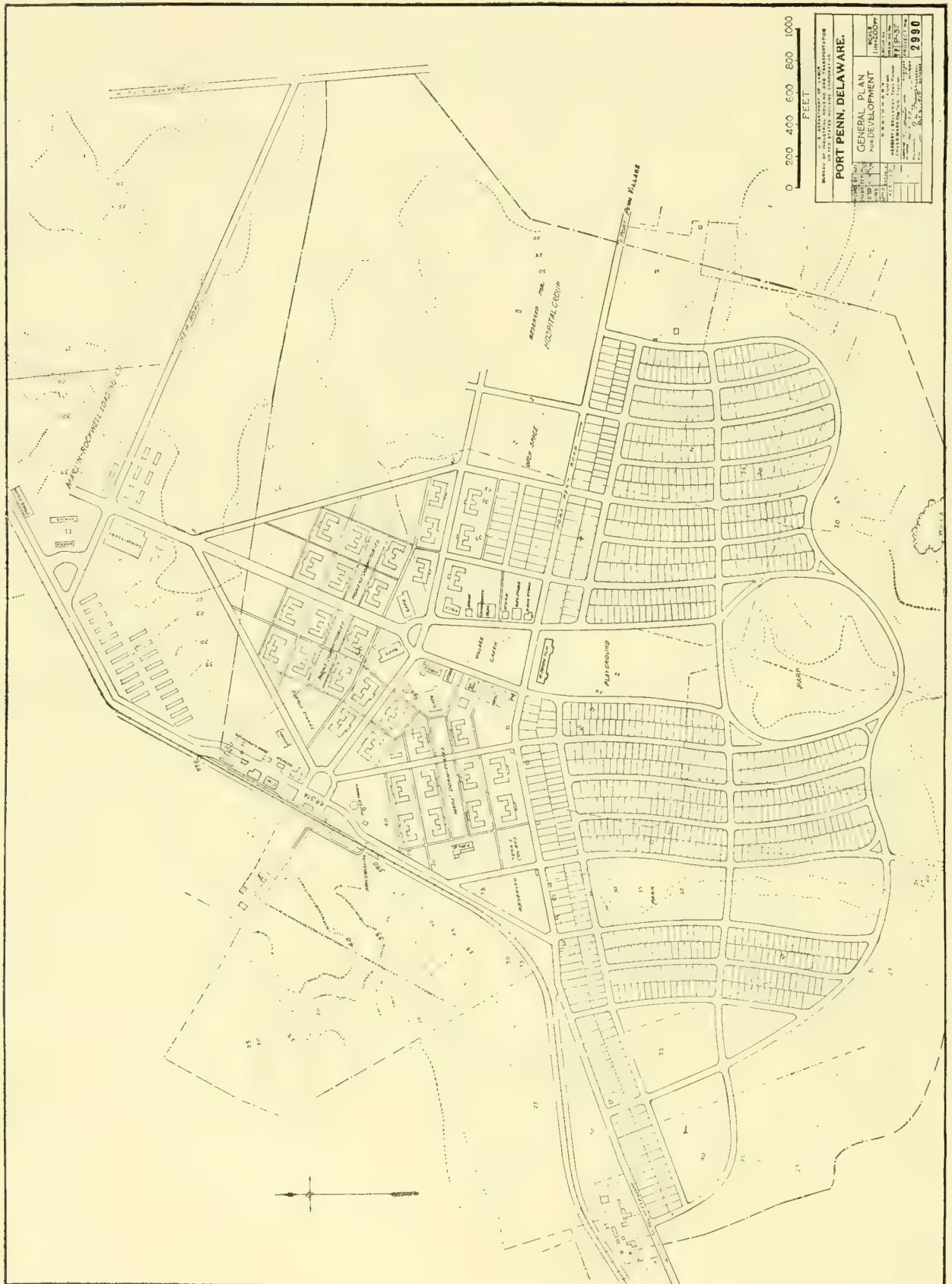
On that date it was determined that it was not necessary to keep the housing so far away from the plant, that site No. 3 would be safe, and that the question of water supply and sewerage were much more easily solved for this site. With the written approval of the Ordnance Department this site was then chosen. Topographic maps were again started, and on November 11 the third preliminary town plan was complete. The signing of the armistice then caused the whole project to be abandoned.

We have, as the result of all this rapid and efficient but seemingly wasted work, three town

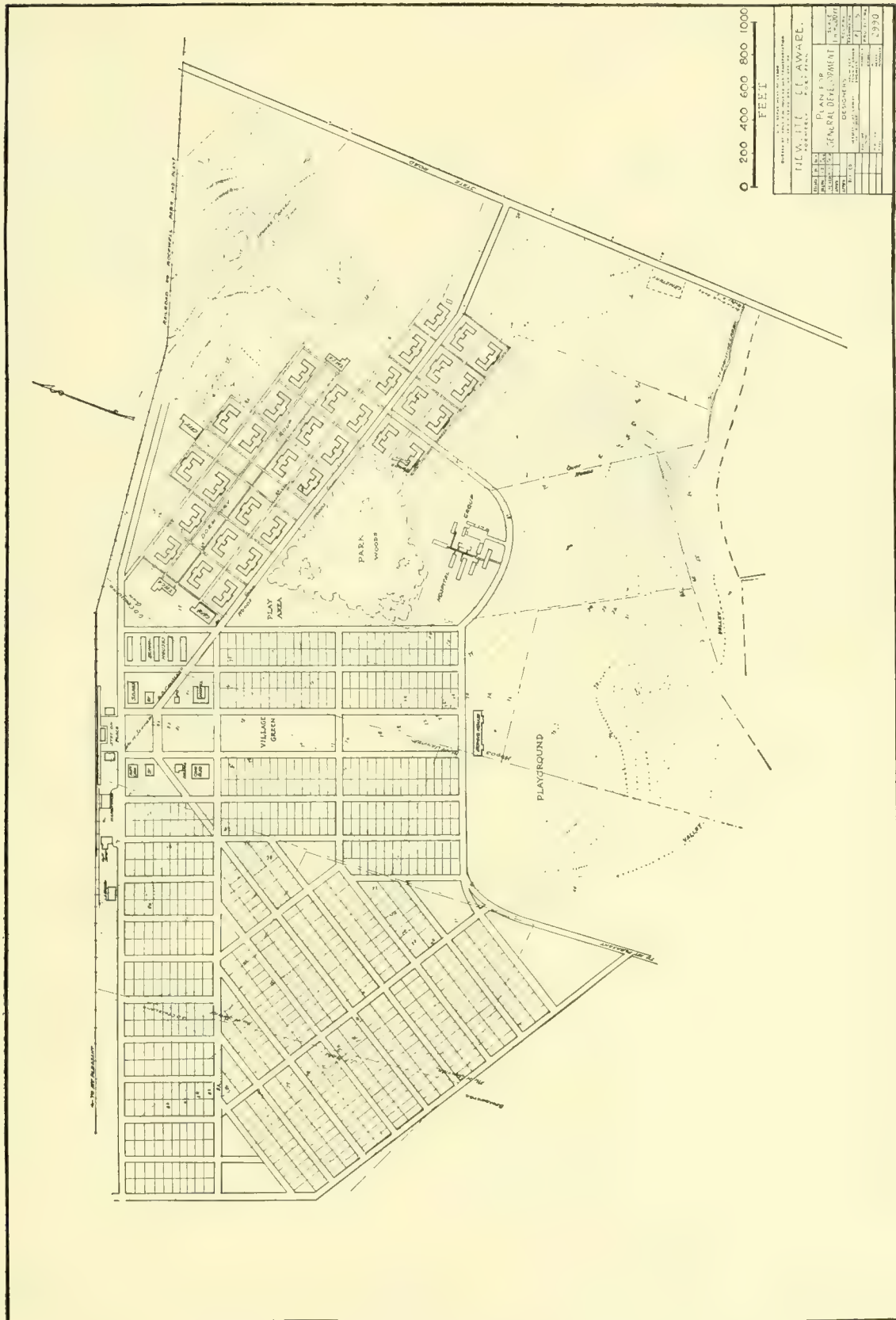
plans, based on practically the same requirements as to housing, but fitted to three different sites. They are here reproduced as they were received from the town planner, hastily drafted in form for first estimate in each case. For each site the layout was influenced more than it would have been in a permanent development by the necessity of speed and economy in first construction, especially economy in the utilities. These were relatively expensive in any case. It is instructive to compare these plans with one another and observe that the fundamental relations of parts have been kept largely the same throughout, though the forms and the appearance of the three layouts are quite different. Also it is interesting to compare these plans with the plan for Seven Pines, a similar project by another designer, and observe how different is the appearance of the grouping, though again the practical relations are not fundamentally different.

The houses being mostly standard stock bungalows were reasonably cheap. The utilities, in spite of the use of wood-stave pipe, were more nearly comparable in expense to those of a permanent development.

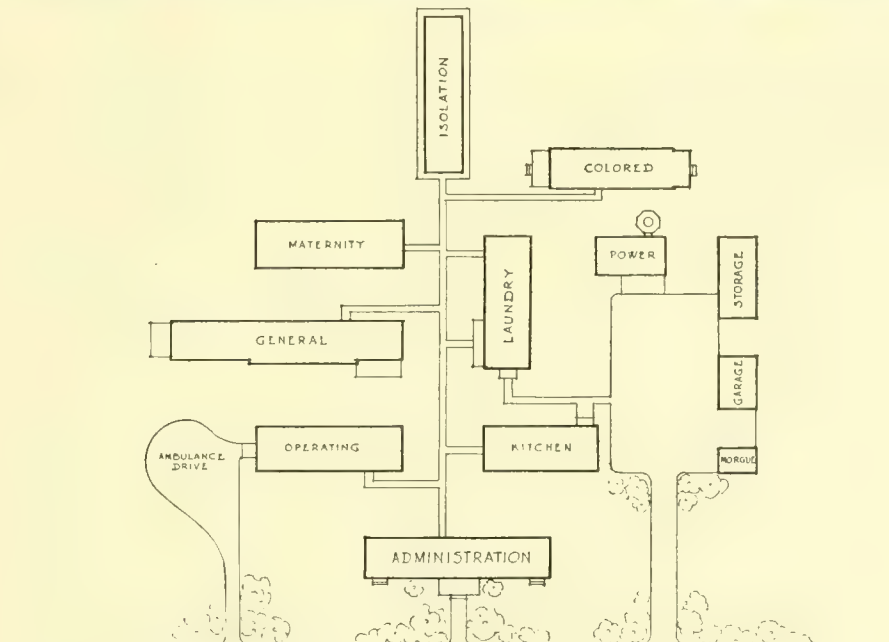
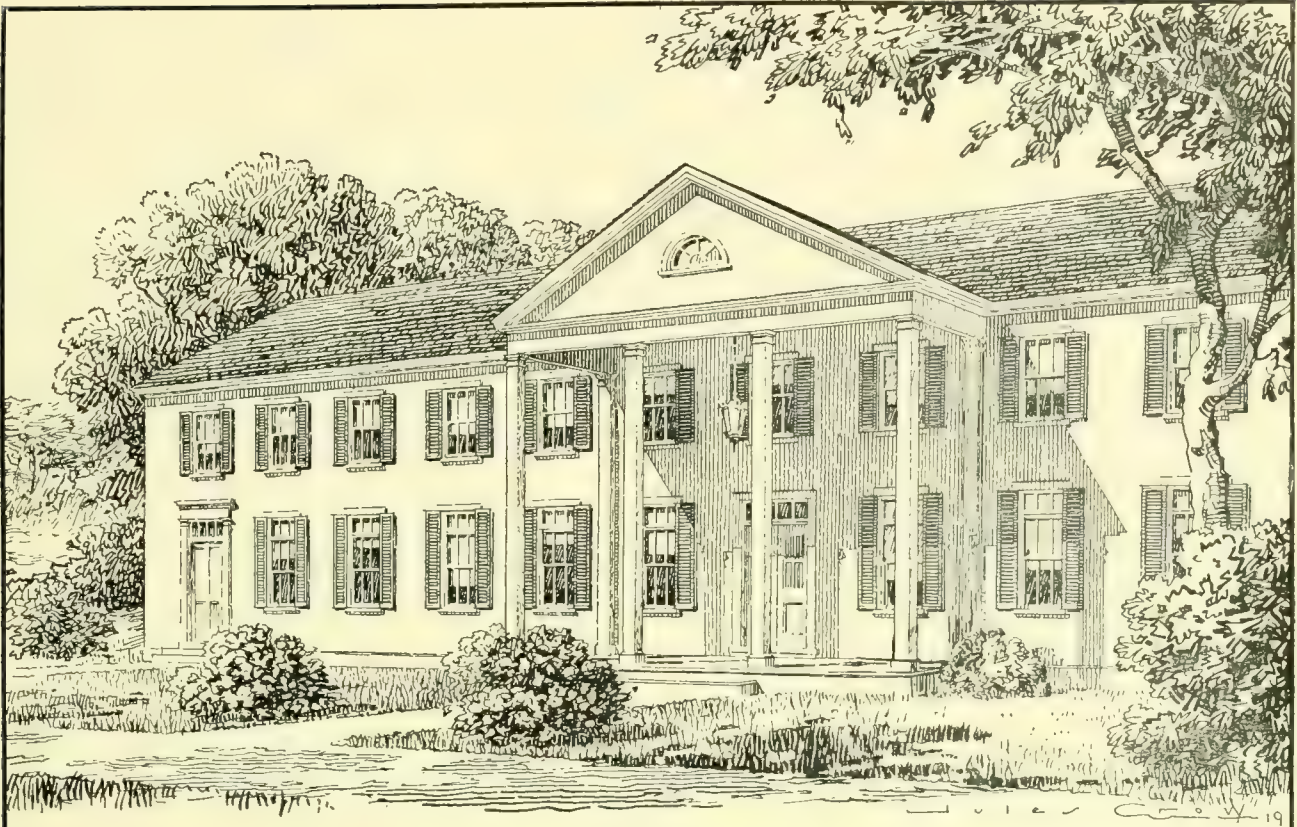




(1) PORT PENN SITE.



(2) NEWSITE.



ADMINISTRATION BUILDING HOSPITAL GROUP

SCALE 0 40 80 120 160 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT PORT PENN DEL

ARCHITECT CHARLES BUTLER

PORTSMOUTH, N. H. (PROJECT NO. 604).

(KITTERY, ME.)

Area planned: 20.52 acres. Housing planned: Detached houses, 16 families; semidetached houses, 48 families; total, 64 families; 150 single workers in hotels.

(Project discontinued. For further information see tables, Chap. IX.)

Portsmouth, N. H., was founded about 1630. The original navy yard dates from about 1800. The U. S. S. *Kearsarge* was built here, and in the Peace Building in the present yard was held the peace conference between Russia and Japan. The city had a prewar population of 11,500. Although Portsmouth is credited with the navy yard, this is actually located on the northerly portion of Seavey Island in Portsmouth Harbor, over the line in the adjoining State of Maine. The yard is connected by a bridge with the small village of Kittery on the northerly shore of Portsmouth Harbor, this town having a prewar population of 3,500. The war activities of the navy yard included the fabrication of submarines. January 1, 1918, 3,200 people were employed and 1,000 more needed. Two other ship-building plants were also developed in the vicinity. Housing was scarce and profiteering was beginning. The situation was in part relieved by the Housing Corporation's purchase and renovation of two hotels—the Pepperell and the Champernowne—accommodating 150 people, both located at Kittery Point, about 3 miles from the navy yard but with good transportation facilities. These hotels were provided with heating plants and additional plumbing, and represent a much higher salvage value than the usual temporary dormitory.

No location for housing within the limits of the city of Portsmouth being at all suitable, after careful investigation 140 acres were selected in Kittery within half a mile of the navy yard and of the village of Kittery, 1 mile from Portsmouth, only a short distance from the post office, and 500 feet from the Portsmouth trolley. One hundred acres are low and swampy, worth little and costing little,

but the remaining 40-acre area is typical New England pasture land, with fair topsoil underlaid in part by rock which approaches within a few feet of the surface of the ground. Much of the land is wooded. The character of development most favored by the workers was detached houses upon half-acre lots, but when the cost of utilities was made clear, the decision was that most of the buildings must be semidetached to make the project more compact and so less expensive.

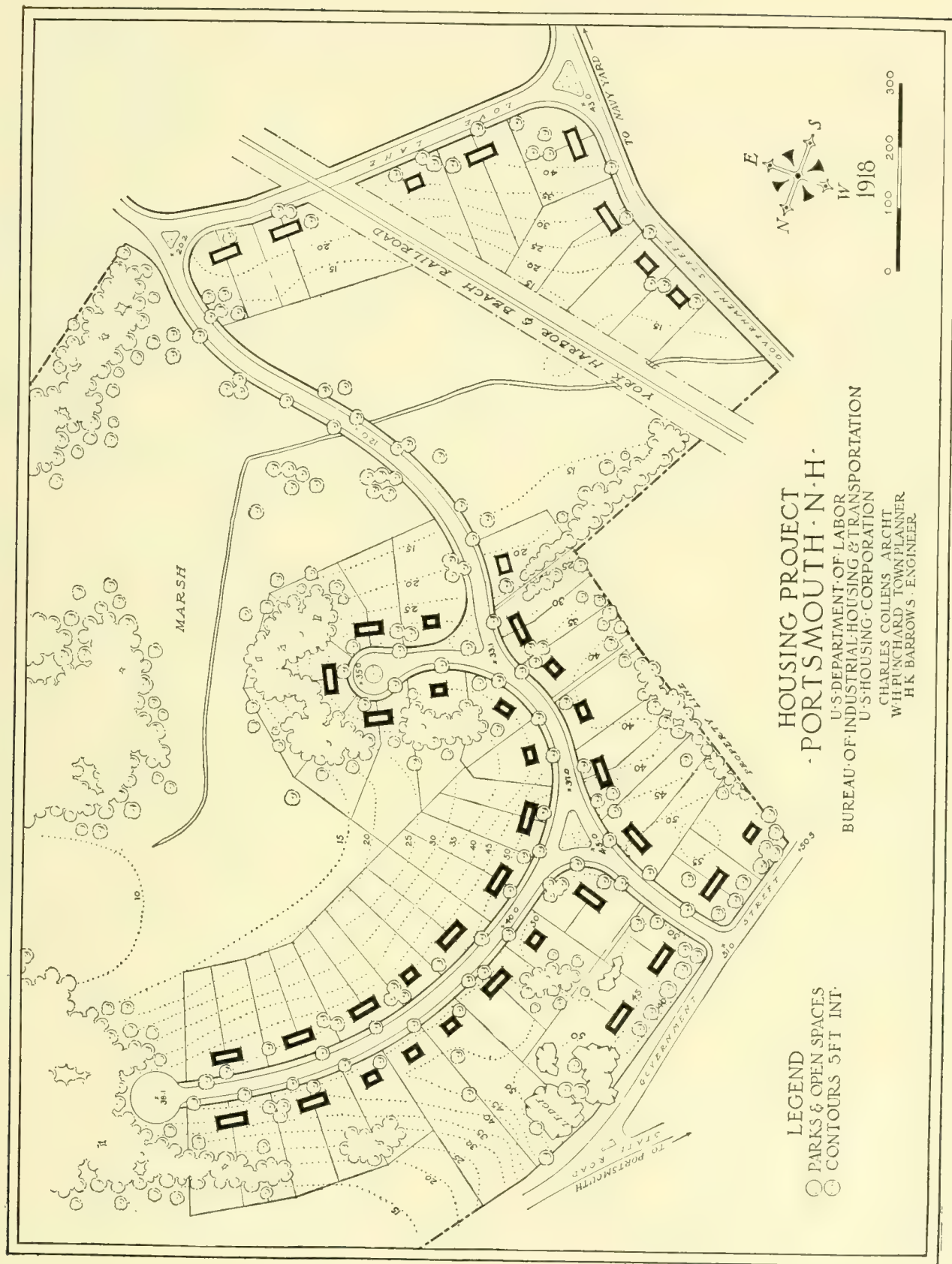
The houses were designed following a local farmhouse type, which has weathered shingles or white painted clapboard walls and has usually a simple, well-designed doorway.

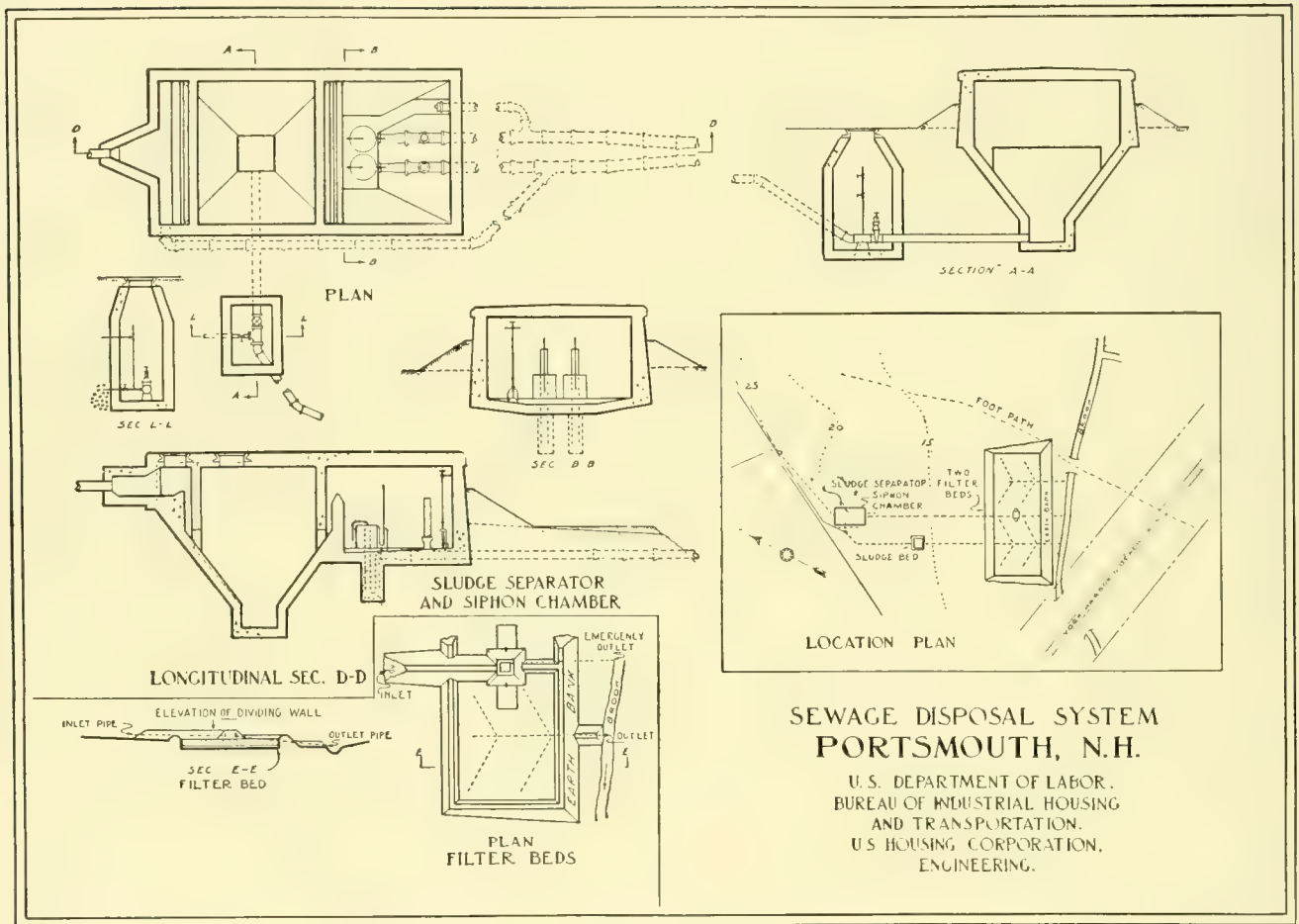
The project is located on two main roads, the State road and Government Street, a part of the main thoroughfare between Portsmouth to the southwest and the navy yard to the east. The tract is crossed at its southerly end by the York Harbor & Beach Railroad. There is a trolley car line and water and electricity available in nearby streets. Sewage disposal had to be completely provided, but would cost little more than cesspools.

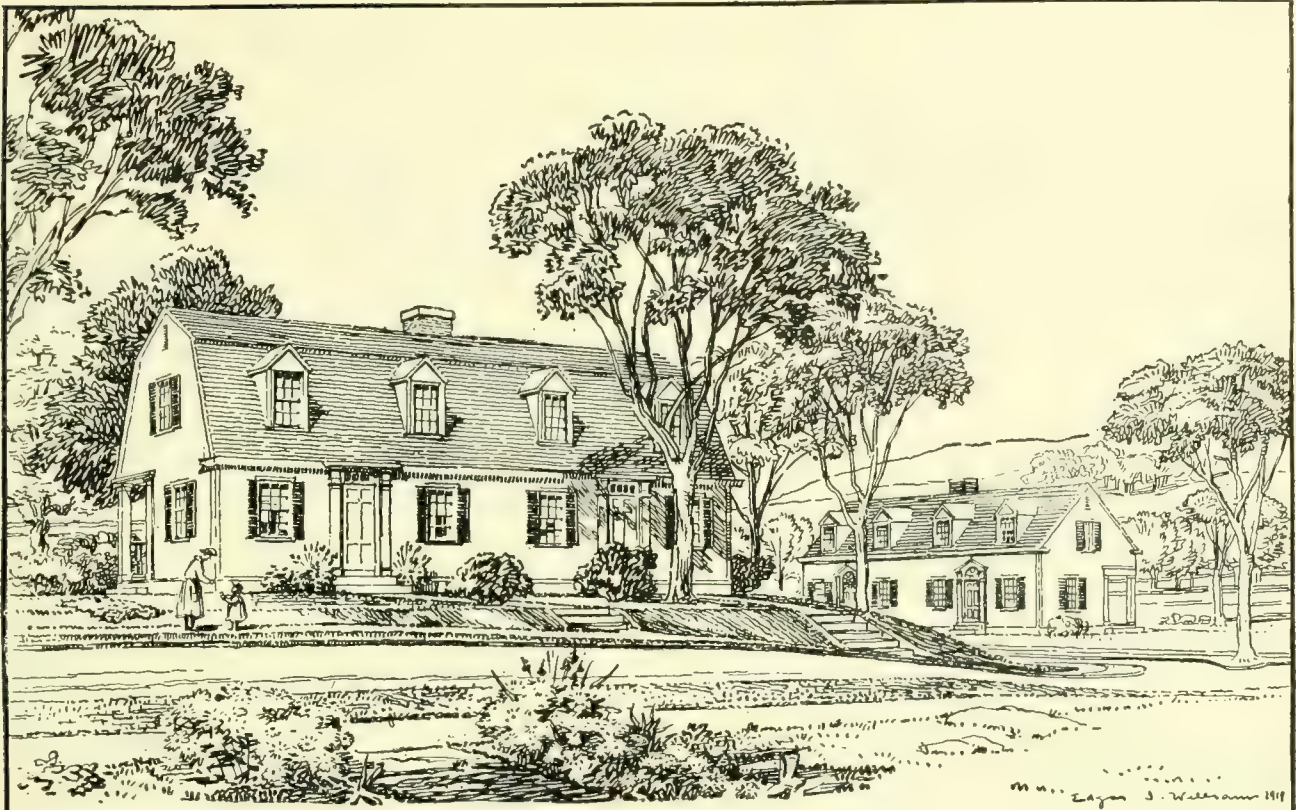
The street plan is closely adapted to the topography and the requirements of the utility mains, resulting in the interesting layout shown, with its two "dead ends," the streets being placed on the tops of the low ridges. There is the minimum of grading for both streets and lots, a particularly important consideration on account of the underlying ledge.

No schools, parks, or playgrounds were provided, since the project was surrounded by open land and the village and schools of Kittery were near.

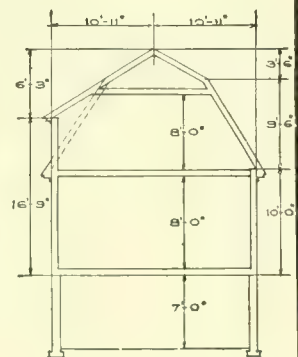
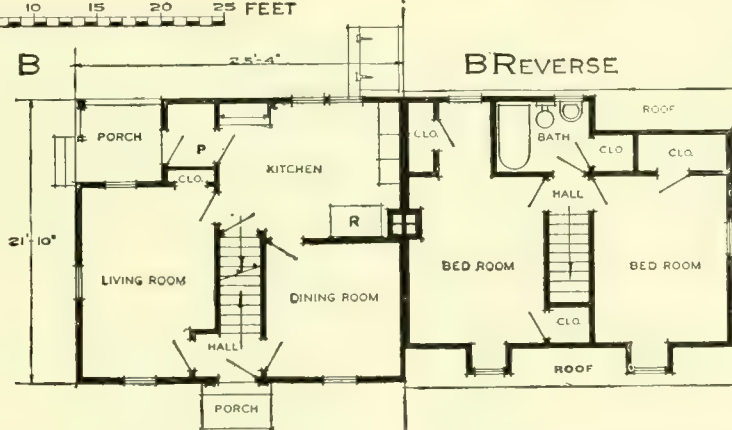




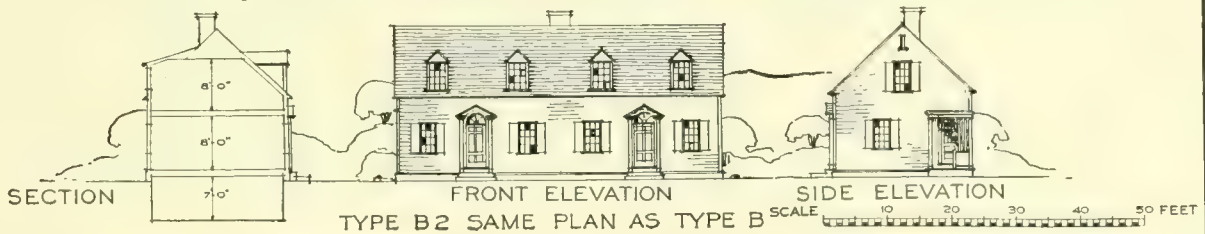




SCALE 5 10 15 20 25 FEET

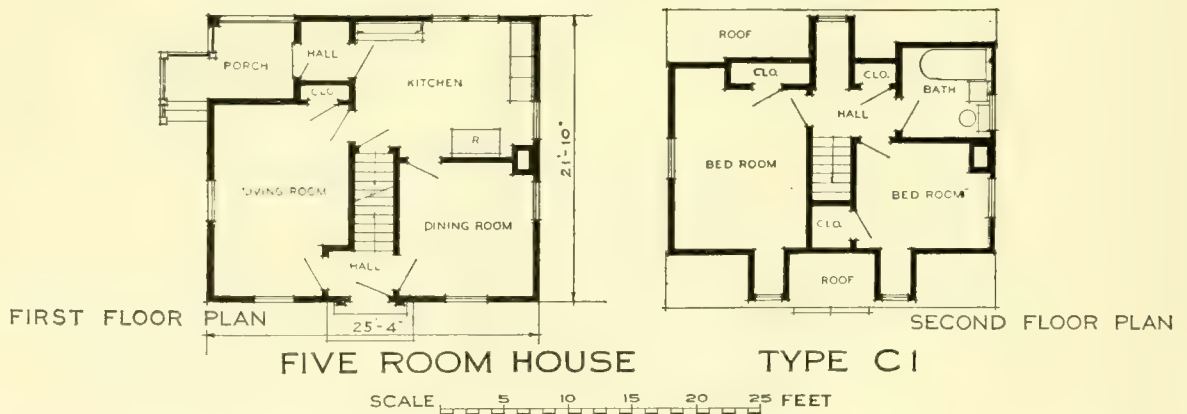
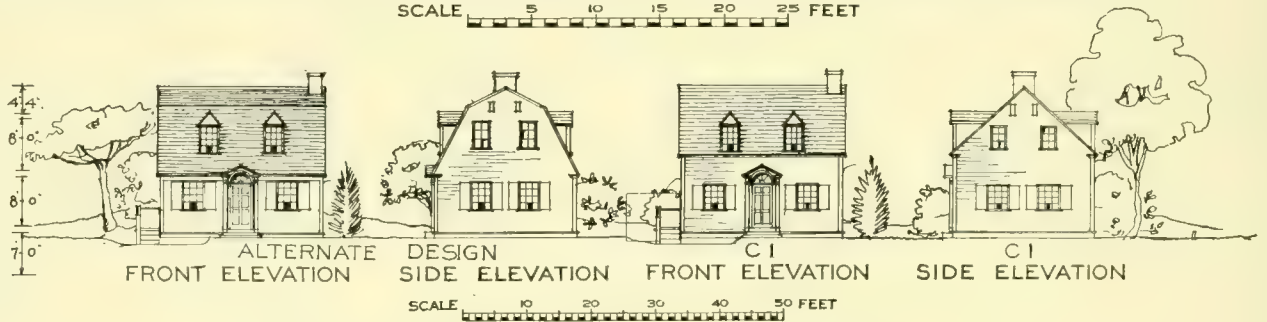
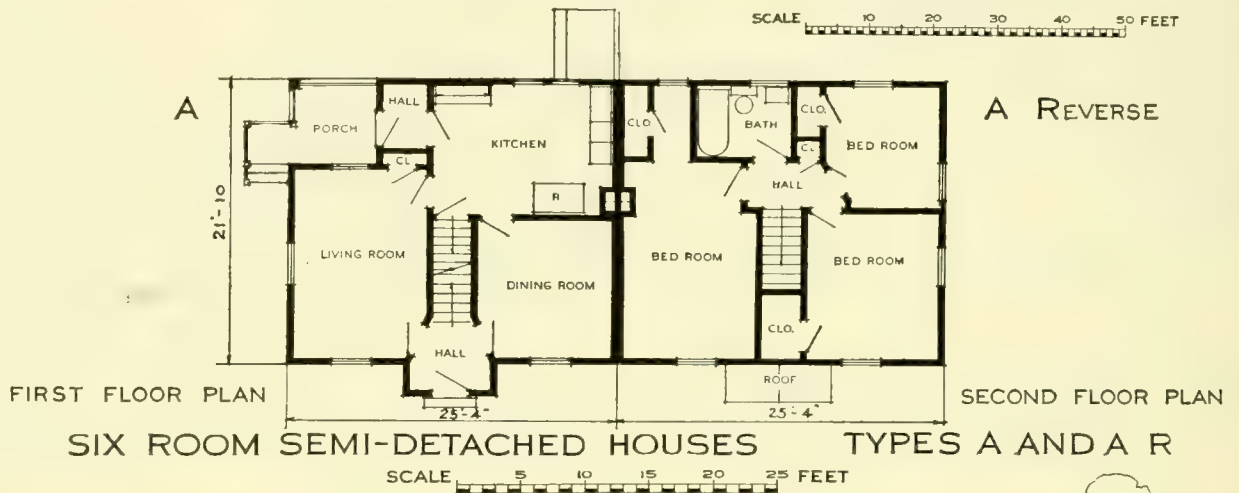


FIRST FLOOR PLAN SECOND FLOOR PLAN SECTION
FIVE ROOM SEMI-DETACHED HOUSES TYPES B AND BR



UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT PORTSMOUTH N H

ARCHITECTS ALLEN AND COLLENS



UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT PORTSMOUTH N H

ARCHITECTS

ALLEN AND COLLENS

PUGET SOUND NAVY YARD, (BREMERTON) WASH. (PROJECT NO. 141).

INSIDE DEVELOPMENT.—Area planned: 41.76 acres. Housing planned: Detached houses, 250 families; apartment houses, 45 families; total, 295 families. Housing constructed: Detached houses, 245 families; apartment houses, 45 families; total, 290 families.

OUTSIDE DEVELOPMENT.—Area planned (as shown on map), 63.45 acres. Housing planned: Detached houses, 286 families. (Area extended and plan in course of revision when abandoned at signing of armistice.)

(Outside development discontinued. For further information see tables, Chap. IX.)

Bremerton, Wash., is located in the northwestern part of the State on Puget Sound, and about 20 miles by water from the City of Seattle, and is the location of the Puget Sound Navy Yard. The navy yard is the most complete on the Pacific coast. It is used for the construction of destroyers, battleships, and many other types of naval vessels, and also has a plant for the manufacture of ammunition. In and near Seattle there are also other large shipbuilding industries requiring large numbers of men.

Bremerton, and Charleston, adjacent to it, have no other basic industry than the navy yard, and their growth has been almost wholly in response to or in anticipation of the demands of navy yard workers, and any anticipation of their needs has mainly taken the form of land speculation rather than of constructing houses. Under these circumstances, in face of the most urgent need for a great increase in the output of the yard, the output was seriously limited by the shortage of housing facilities. Transportation from other communities was wholly by water, subject to uncertainties, making it unsatisfactory as the main reliance, apart from the fact that the running time from Seattle, the only large community, was over an hour, and that there was also a very serious housing shortage in Seattle. Local response to the increased demand took the form of room crowding, of the erection of tents and shacks, and of the exaction of high rents. It did not make it possible for more than a small fraction of the necessary additional employees to accept positions at the yard.

It seemed to be certain that the yard would under any circumstances, and irrespective of the war, remain one of the principle yards of the coast with a permanent need of more workers than Bremerton could now house, and an allotment was therefore made by the Housing Corporation for permanent housing.

In response to urgent requests of the naval authorities a hotel for 350 with a large cafeteria was constructed on a site (at H on plan) already

partly owned by the Government, adjacent to the yard and so situated that it could have direct connection therewith by means of a subway, and an apartment house for 45 families was constructed on a site about four blocks from the yard (at A on plan). It was apparent also that a large program of individual house building was desirable. The naval authorities urged the purchase of a number of contiguous parcels on and near the north shore of the peninsula about a mile from the yard, and the creation of a distinct new suburban community there. The land was very attractive and well suited for the purpose, the principal objection being the delay and extra labor involved in the installation of wholly new sewers, water mains, and other street utilities. The alternative, urged by many citizens of Bremerton, and favored by our own Real Estate Division, was the erection of houses on some of the numerous vacant lots nearer to the navy yard and to the shipping center, on streets already supplied with utilities in whole or in part. After considerable delay, due to conflicting reports and opinions and the difficulties of communication between Washington and Bremerton, it was decided mainly as a matter of speed to erect 250 detached houses as an "inside" development on the most available sites on existing streets in Bremerton and Charleston provided with water and sewers. The district is rough and hilly, its actual development has been very "spotty," and a great deal of work was involved in the tentative selection of these scattered vacant lots, with due regard to the estimated going market value of each, to the cost of putting in the necessary improvements for each, and to the value of the finished house and lot for a navy-yard employee; and after the tentative selection an immense amount of work was involved in negotiations for their purchase at fair prices, resort to arbitrary requisition proceedings being held in reserve, so that the method did not save as much time as was hoped. By the time work was well underway on the 250 houses of the "inside" development it became apparent that a much larger measure of relief would

be necessary, and the "outside" development was authorized in addition.

The surveys and plans for this "outside" development had been completed and adopted, providing for the immediate construction of a village of 286 houses with room for expansion to several hundred more. The portion proposed for immediate construction is shown on the map. At the signing of the armistice the plan here shown was being altered, so as to make the main entrance through some additional land from Warren Avenue near the "inside" houses instead of from Chestnut Avenue, and work was proceeding rapidly on the contract for grading and utilities. The signing of the armistice caused the cancellation of all work on the "outside" project and return of the land to the owners, but the work on the "inside" development was completed.

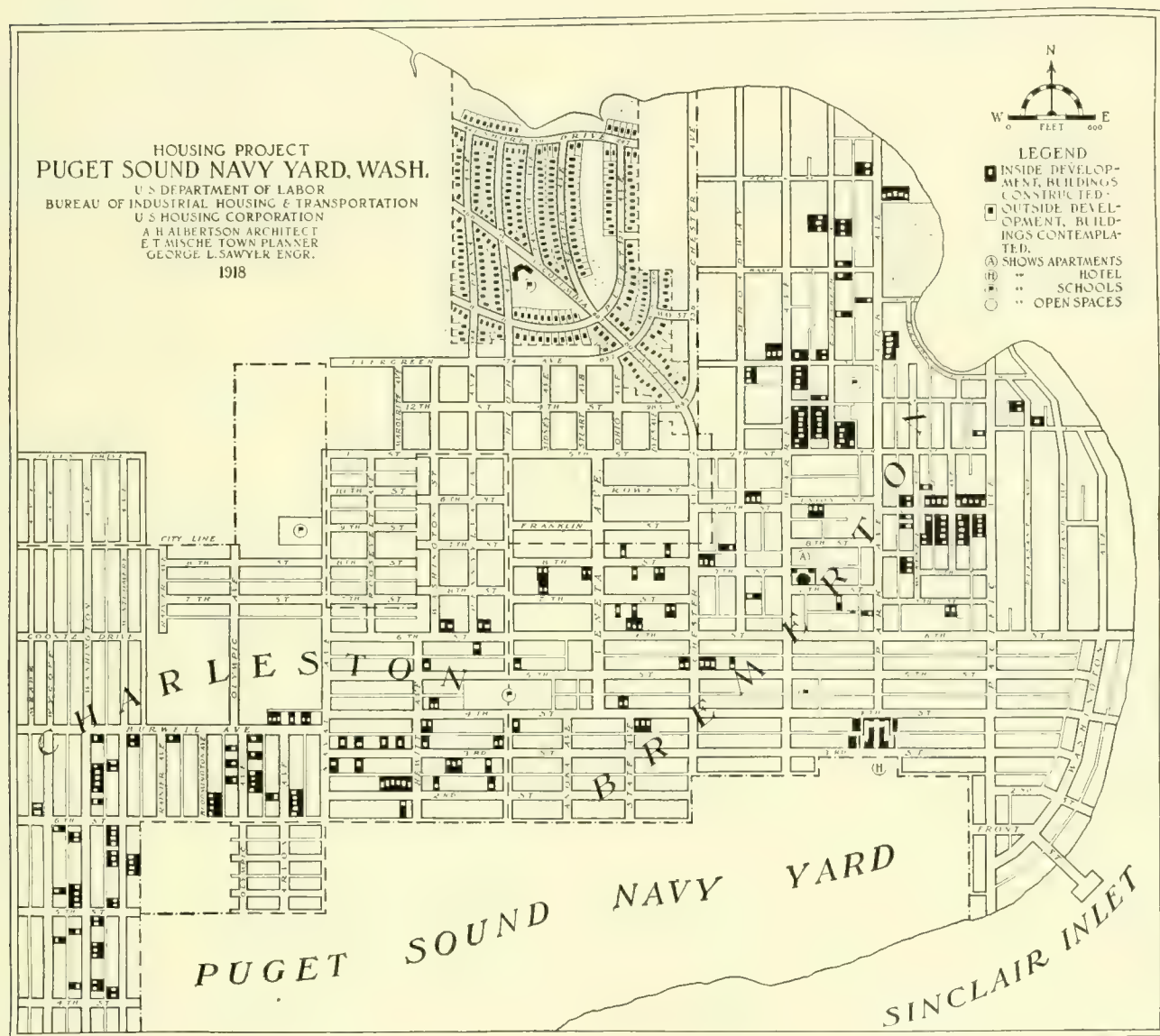
In the "inside" project, on the lots within the city limits, practically all utilities had been previously installed, but on investigation by the engineers of the Housing Corporation it was found that the water service for fire protection purposes would be entirely inadequate to properly protect the houses, as the water system of Bremerton was composed chiefly of 4-inch pipe and in such great lengths that the pressure for fire purposes would be almost nothing. The question was accordingly taken up with

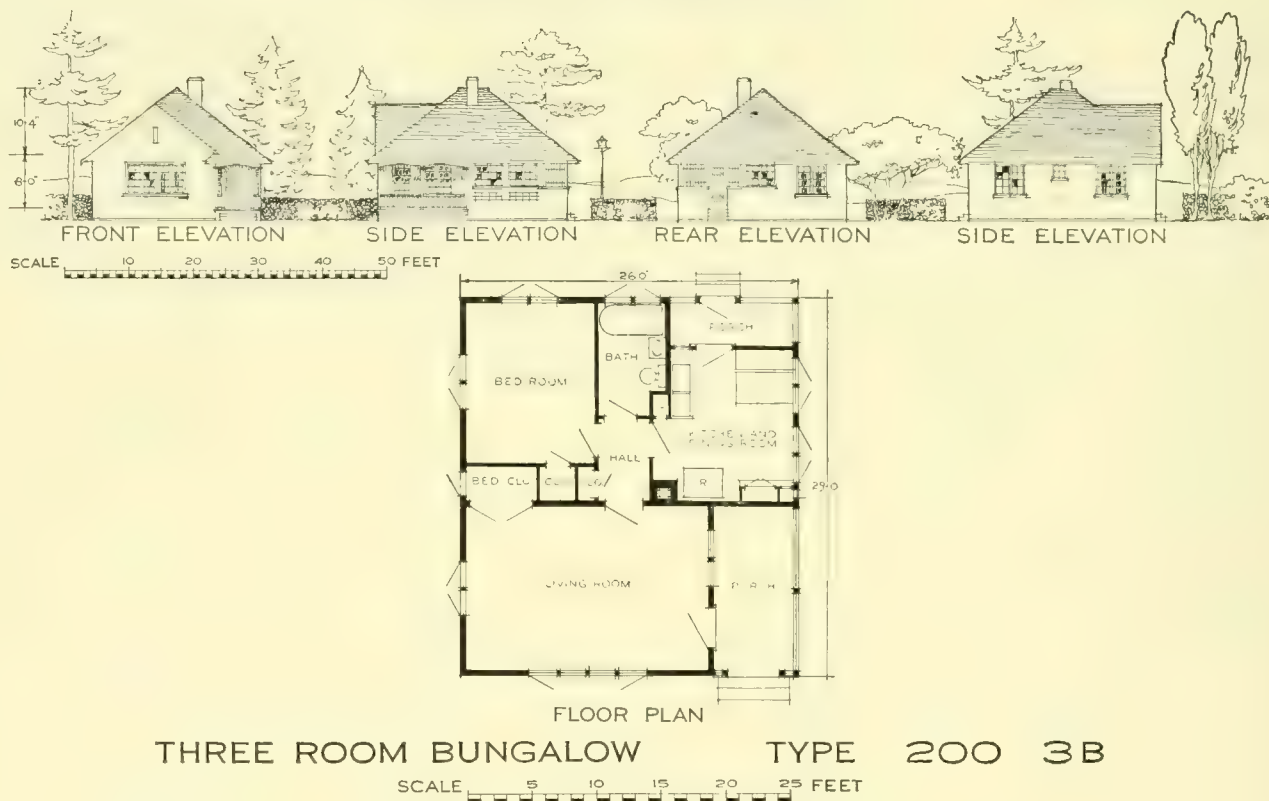
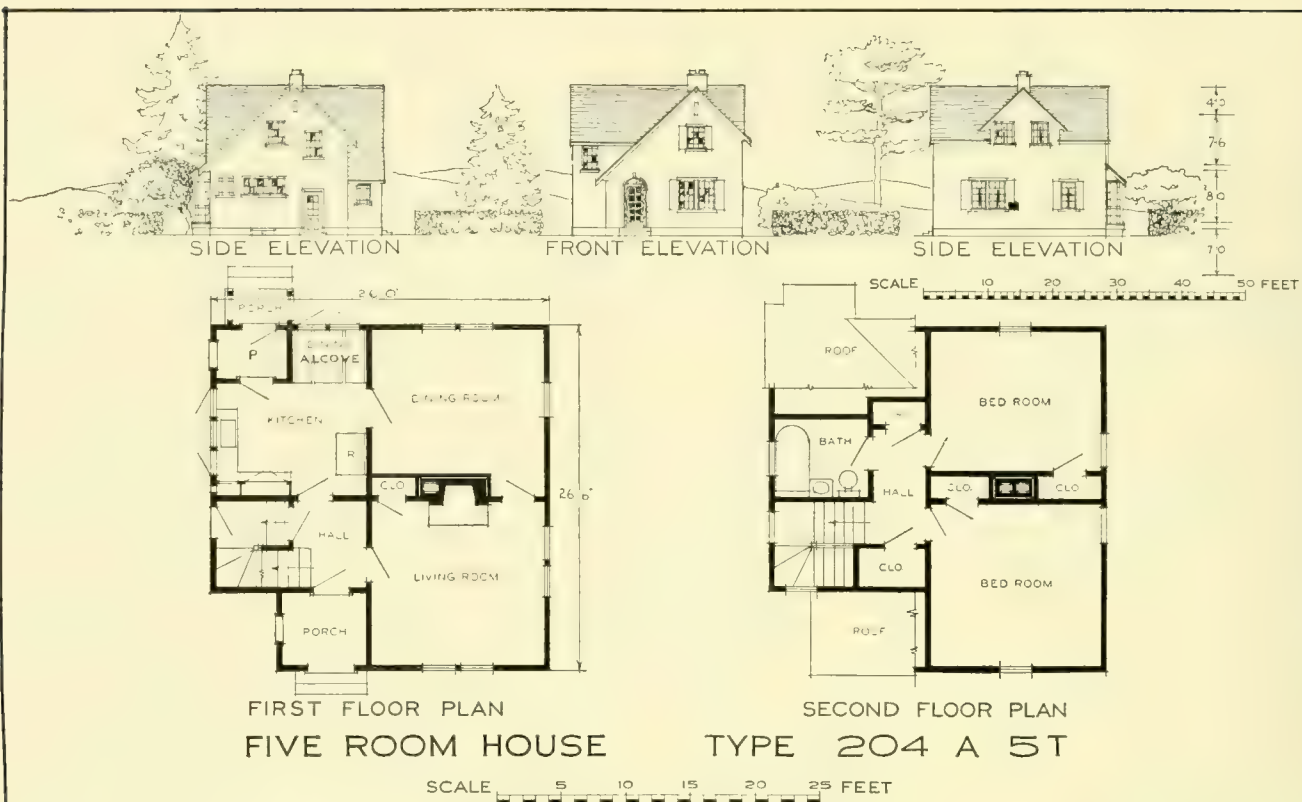
the city of Bremerton, and the city agreed to construct through the center of the city a 16-inch force main which would act as a backbone to the water system, providing a main feeder pipe of sufficient size, and also to construct additional side mains of sufficient size on the other streets where needed. This work was to be done at the expense of the city of Bremerton.

The houses erected by the corporation in some cases are isolated from each other and in other cases are arranged in small clusters ranging from two to twenty or so, mixed in with houses quite different in design and character. There is, therefore, no designed harmony in the general aspect of the community. Among the corporation's houses themselves, there is a unity of expression which makes it possible to single them out and yet they are not so radically different as to look out of place, as in the case of the isolated brick houses in part of the Grasmere development at Bridgeport. We find in the corporation's houses a refined quality, as a rule, which is lacking in their neighbors.

Individually the Bremerton houses are excellent, though the use of such delicate columns to support the large porch roofs in many cases is questionable architecturally. Nowhere among the corporation's developments have bungalows been designed better.







UNITED STATES HOUSING CORPORATION
 DEVELOPMENT AT BREMER TON WASH
 PUGET SOUND NAVY YARD
 ARCHITECT A. H. ALBERTSON

QUINCY, MASS. (PROJECT NO. 62).

At Quincy, a city about 7 miles southeast of Boston, are located the great Fore River Shipyards, a subsidiary enterprise of the Bethlehem Steel Co. Quincy has been until recent years a residential suburb with but comparatively little manufacturing and no very important industries except the well-known granite quarries. The prewar population was about 40,000. The present population is about 50,000 people, of whom fully 18,000 are foreign born. Before the war the shipyards employed about 4,000 men. Navy Department and Shipping Board contracts increased this number nearly four fold, producing a most serious housing shortage and entailing an enormous labor turnover with limitation of output; 3,000 men had to be hired in one month to secure an addition of 1,000 to the force. Unhealthy conditions due to overcrowding were common. A portion of the work of the shipyard continued night and day, being conducted on a three-shift basis, and in some of the boarding houses beds were used on a three-shift basis also.

The Fore River works were practically the only war industries in the town. Their workers could be roughly classified as follows:

1. Foreign-born both skilled and unskilled, about	4,000
2. American-born unskilled, about	3,000
3. High paid outdoor workers, about	4,500
4. High paid skilled mechanics, about	4,500
Approximate total	16,000

The Housing Corporation studied the situation very carefully before determining on a policy. Some relief could be obtained by improving the street-car transportation, but workers were already coming from Boston, and from towns farther away, so that any considerable improvement in transportation for them would involve large changes in a complicated metropolitan system; hardly a practicable expedient. Some local street-car and other traffic improvements had already been made. Washington Street near the shipyards had been widened, the car line double-tracked, and a terminal built just outside the shipyards. A jitney bus line was also in service.

It was evident that a large amount of housing was imperatively needed, that some of it at least should

be for lower paid labor, and that in view of the street-car difficulties and the congestion of street-car traffic near the shipyards the housing should be within walking distance of the yards. For speed of construction the housing should be in considerable unbroken areas, but should also be near existing utilities. After a detailed consideration of all sorts of alternatives, the Housing Corporation chose for development four sites, the most distant being about a half-mile from the plant, separated from each other by limited areas already occupied in large part by detached wooden houses on small lots.

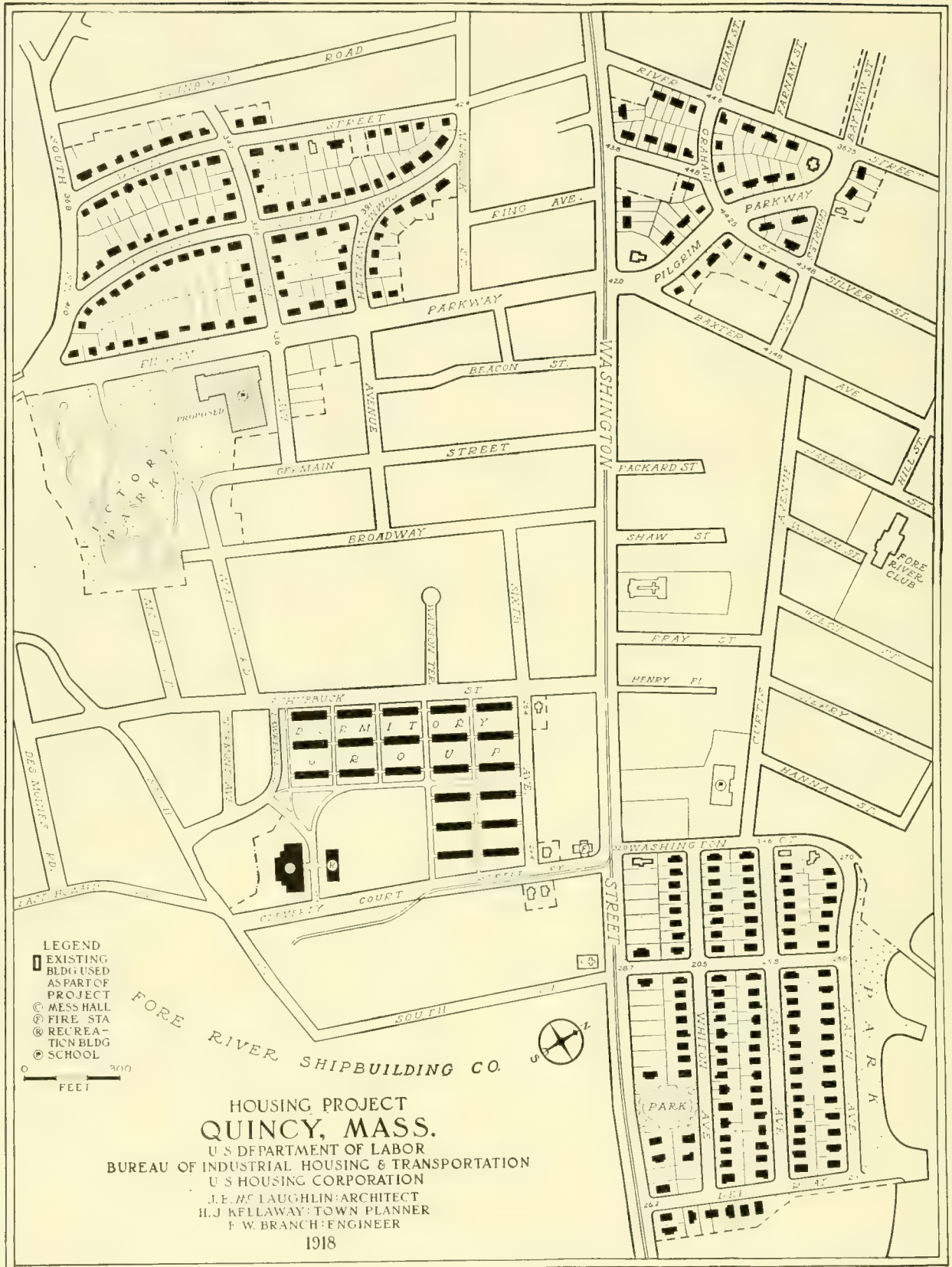
Arnold Street Tract.

Area planned: 18.30 acres. Housing planned and constructed: Detached houses, 77 families; semidetached houses, 50 families. Total, 127 families. Also one old house repaired and used.

(For further information see tables, Chap. IX.)

The Pilgrim Parkway was extended through this tract by widening the old and partially improved North Street. Ruggles Street and the curving portions of Commonwealth Avenue, Fifth Avenue, and Arnold Street are new. The curves were determined partly to fit the topography, partly to give convenient "leads" toward the plant via South Street, and partly for the sake of appearance. In execution, the general effect, especially on Ruggles Street, is very pleasant. Where an attempt has been made to vary the straight building line of the Pilgrim Parkway by differences of setback, the variation has perhaps been overdone, as far as appearance goes, as at many other projects. The depth of setback here is due also, however, to saving expense in cutting high banks. The arrangement of houses on the south side of Commonwealth Avenue en echelon instead of parallel with the street, although almost forced by considerations of lot sizes and shapes, is distinctly unpleasant in appearance; whereas the arrangement en echelon in the Baker Basin tract looks well, apparently because it there forms a terminal incident of a long line of houses which are parallel with the street.

The easterly part of the tract across the Parkway provides a site for a few more houses, for a school, and for a park on the rocky hill, which serves also the good purpose of cutting off the noise of the shipyards from the houses. To the south of the hill we



had made an arrangement with the landowner and with the city whereby South Street was relocated as a continuation of Des Moines Street in accordance with the new street plan recommended by the Quincy City Plan Commission, thereby furthering a civic improvement and raising the frontage value of the property concerned, part of which we were planning to acquire. This arrangement was stopped by the armistice, as far as the corporation was concerned, but the improvement will probably be carried out at some future time.

Baker Yacht Basin Tract.

Area planned: 21.78 acres. Housing planned and constructed: Semi-detached houses, 18 families; detached two-flat houses, 218 families. Total, 236 families. Also two detached houses moved and remodeled, and one detached house repaired and used on original site.

(For further information see tables, Chap. IX.)

This tract, intended to provide for unskilled workers, had to be planned with a density of about 13 families to the acre in order to keep down the cost for lots, the presence of the seashore park offsetting the relative density of population. Row houses were considered, but the detached two-flat house was adopted as the principal type because of local custom. The side space between buildings is never less than the standard minimum of 16 feet, but seldom much exceeds the preferred minimum of 20 feet. These spaces are sufficient to provide light and air, but they are none too much in the case of three-room deep two-flat houses. The lots are generally 90 feet deep.

Streets had been platted and rough graded in this tract when the Housing Corporation bought it, including Baker Avenue, another street parallel to it only a short distance east, and two transverse streets so spaced as to give a row of lots backing toward the shore. This street system left the very deep lots along Washington Street and thus made the rest of the lots very shallow. In our development of the whole area from Washington Street to the shore, every interior street was changed except Baker Avenue, the street near Baker Avenue and parallel to it being omitted as not worth its cost. The advantage of fronting houses along Avalon Avenue toward the shore park and the harbor view, together with the advantage of increasing the lot depths to 90 feet, was added to the advantage of the gain of one row of lots. Provision was made for the future extension of Lawn Avenue (an offset continuation of Curtis Avenue) into adjacent open

land east of Dee Road so as to tie our plan into the general street system of the city.

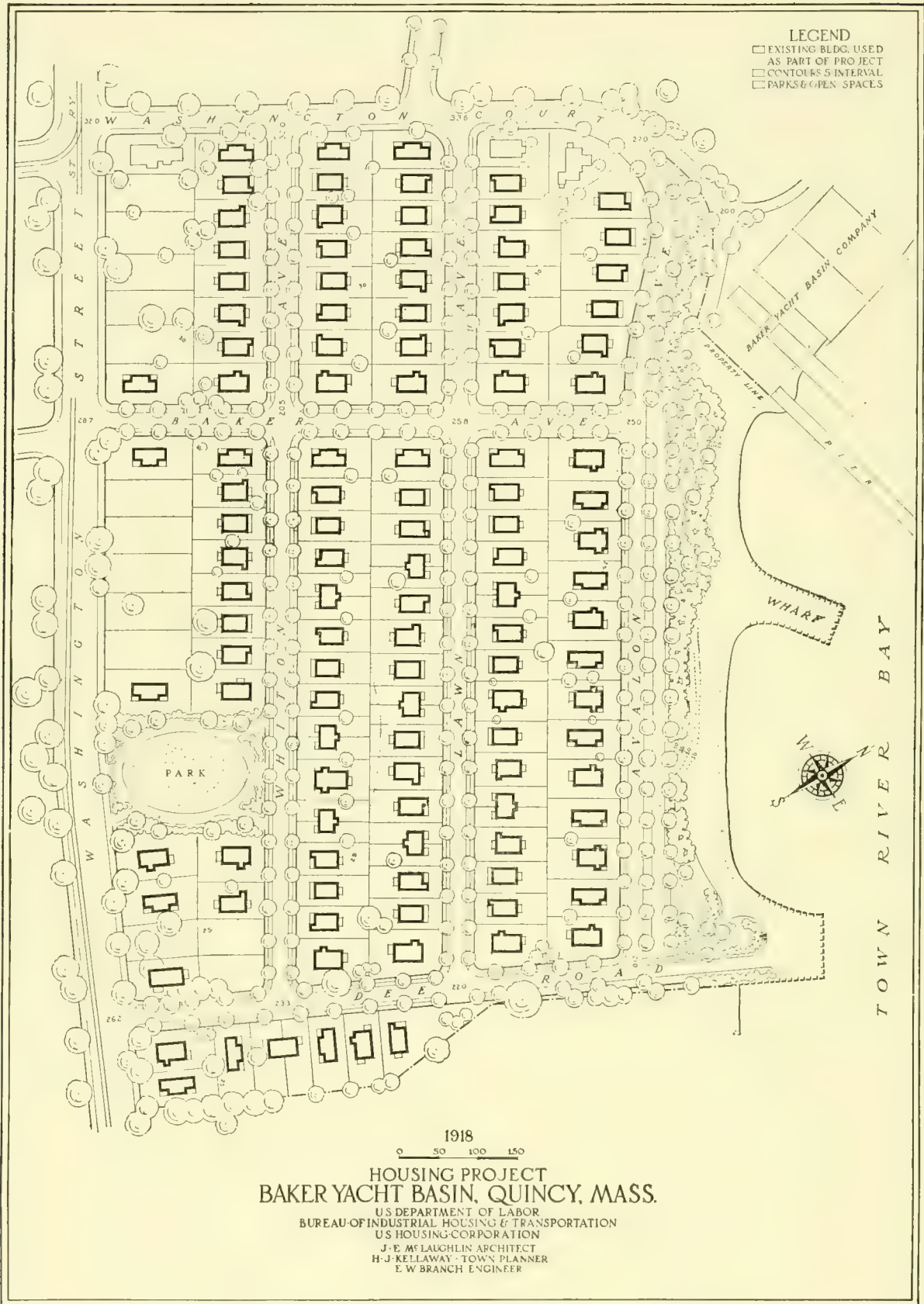
Several old houses existed along Washington Street. These, being unfit for use, were removed and new houses are being built on each side of the entrance roads, giving the development a reasonably good appearance from Washington Street, the main approach. The other vacant lots are held for future development. A deep "pot-hole" which could not be immediately built on in any case, was filled with material from cellar excavations and set aside as "Whiton Park." The steep bank along the water-front was graded down, furnishing sand for house-construction and concrete walks, and for street-filling on the other tracts. This shore-front will be a permanent local park and bathing beach.

River Street Tract.

Area planned: 9.17 acres. Housing planned and constructed: Detached houses, 13 families; semidetached houses, 46 families. Total, 59 families. Also one old detached house moved and repaired, and two detached houses bought and used on their original site.

(For further information see tables, Chap. IX.)

An opportunity was used here to make the housing development aid in carrying out an improvement already projected in a preliminary way as part of the city plan of Quincy. The site lay in the course of the proposed Pilgrim Parkway, an extension of the Metropolitan park system intended to carry pleasure traffic from Boston past the congested business center of Quincy toward Plymouth. Assuming the widening of Bay View Street to the northwest as proposed on the city plan, the Pilgrim Parkway was laid out 70 feet wide between property lines and 110 feet wide between buildings, but with only a 24-foot roadway at present, connecting on curving lines across Washington Street with the end of North Street, which runs through the Arnold Street tract. The extra width of this street and its location, in connection with the irregular shape of the tract, involved the sacrifice of a few lots which could have been obtained with a street plan designed wholly for local purposes; but in a development intended for skilled workmen the spaciousness of appearance obtained from the wide street and the higher values likely to result when the connecting parkway is opened seemed to justify the adopted plans as a business proposition, apart from the duty of assisting rather than obstructing a general public improvement.



The houses along Pilgrim Parkway, mostly pairs of semidetached houses with their length following the gently curving building line, without variation of setback or any attempt at variety other than is given by the curve of the street itself, are very pleasant in their general effect.

Cleverly Court Tract (Dormitories, Project No. 62a).

Area planned, 12.80 acres. Housing planned and constructed, 21 dormitories, 966 men; kitchen and mess hall; and recreation hall. (For further information see tables, Chap. IX.)

This tract, nearest to the plant and least attractive for residential purposes, was devoted to temporary housing for unskilled single men. There is a considerable area for recreation ground. The long open spaces between the rows of dormitories, without inclosure at the ends, are not agreeable in appearance, but provide good opportunity for stopping a fire. The addition of planting would much improve the appearance.

The utilities problems for the four housing sites were very similar. The water supply for the city of Quincy is obtained from the Metropolitan Water District. Since the housing development is located within the corporate limits of Quincy, the city has entered into an agreement with the Housing Corporation to extend without cost to the Housing Corporation the necessary water distributing mains. This will afford an excellent supply of water both for domestic use and fire protection.

Separate storm-water and sanitary sewers are installed in Quincy. The storm-water sewers have their outlet in the nearest running stream or body of water. The sanitary sewers all drain into the Metropolitan sewerage system. The city of Quincy awarded a contract for the installation of the necessary sanitary and storm-water sewers to accommodate the housing development. Under the terms of the contract with the Housing Corporation the cost of this work is to be divided equally between the Housing Corporation and the city.

In the three permanent developments there are five, six, and a few eight room single houses, semi-detached houses, and 2-flat houses. They are in accordance with the corporation standard plans.

In each case the plans have been well worked out, and by careful study full value has been given to the limited sizes determined upon by the corporation. In the Arnold Street and the River Street tracts some of the houses are of brick, while others are of shingle or clapboard. In the Baker Basin tract shingle or clapboard only have been used as an outside covering. Most of the houses are roofed with asphalt shingles, green in color, while a few have slate roofs. All the developments are similar in appearance, the houses of one being repeated at the other two sites; but each development shows special study to suit such differences of conditions as prevail. The houses are of colonial type, as befits the district in which they exist, and all are very good examples of their kind.

Here, as at a few other of the corporation's developments, the details of cornices and porches are nicely proportioned and of simple and refined character quite in keeping with the style of the houses themselves. The doorways, too, especially in semidetached houses, are very well designed.

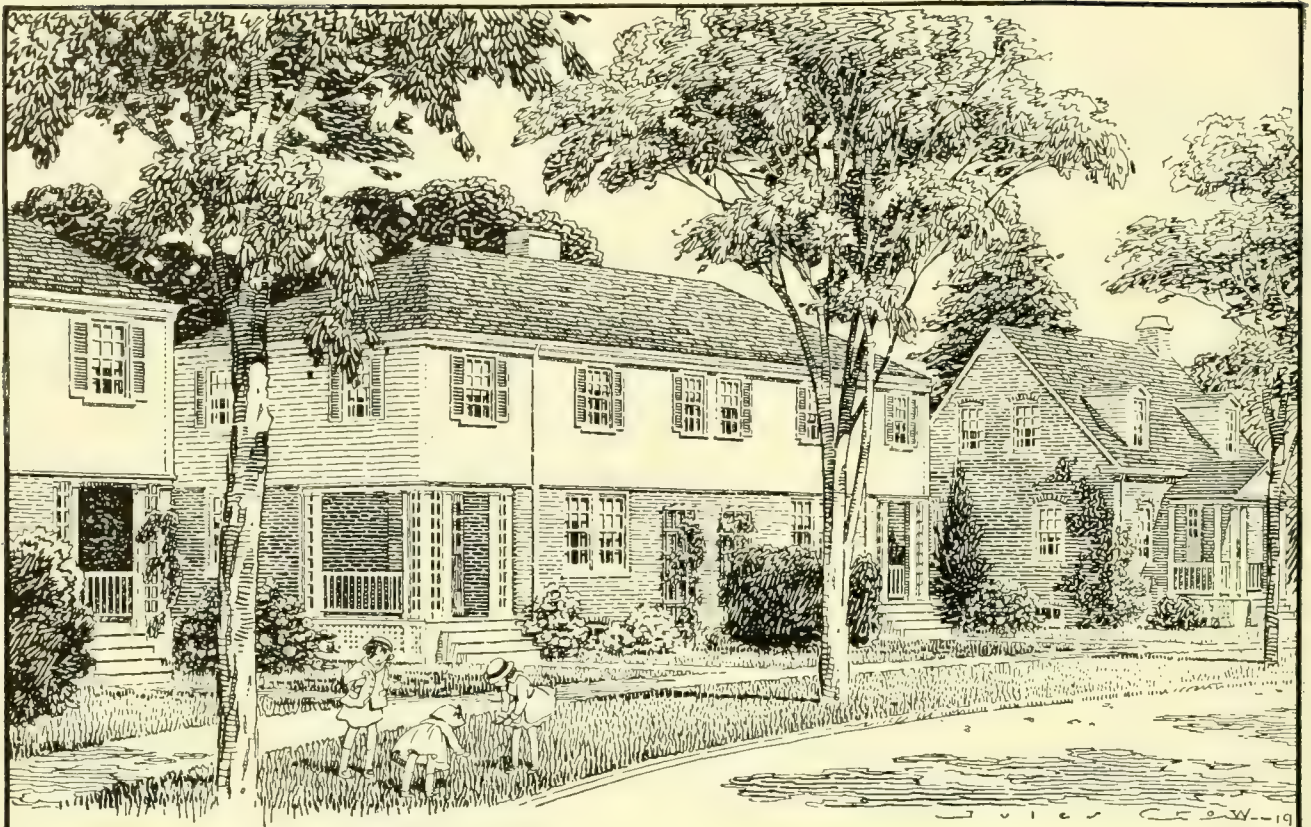
The A-6 houses of the Arnold Street tract, as well as the brick houses, are particularly attractive, the gabled dormers of the former being much better in appearance than houses of similar design which have flat roofs on the dormer windows.

In the Baker Basin tract, the small gable with the circular head doorway at the second story porch is an attractive feature of the 2-flat house as is the entire entrance porch; the steps of these entrances, however, should face the front of the house in every case.

The size of the 2-flat houses is such that the roof might well have been made more effective by being a little higher in pitch or else the eaves might be made greater in projection. The bulk of these buildings being large it causes the single houses close by to appear diminutive by comparison.

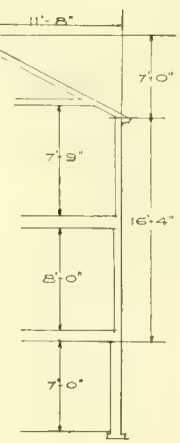
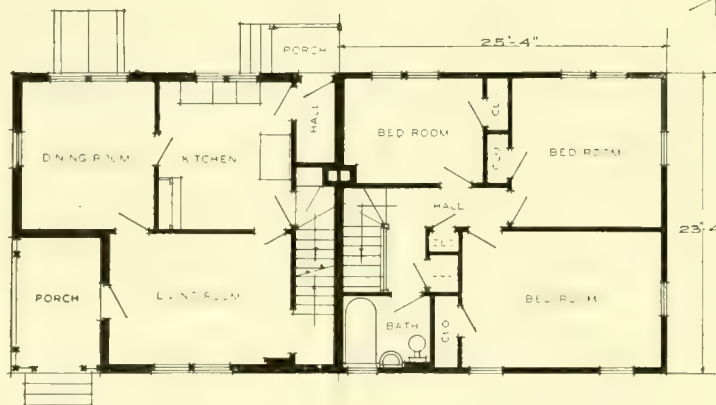
But all in all, these three developments are well handled. The variety in the designs is quite sufficient and yet the unity of appearance has not been lost and the houses compose well as viewed along the streets.





B6A

B6A REVERSE



FIRST FLOOR PLAN

SECOND FLOOR PLAN

SECTION

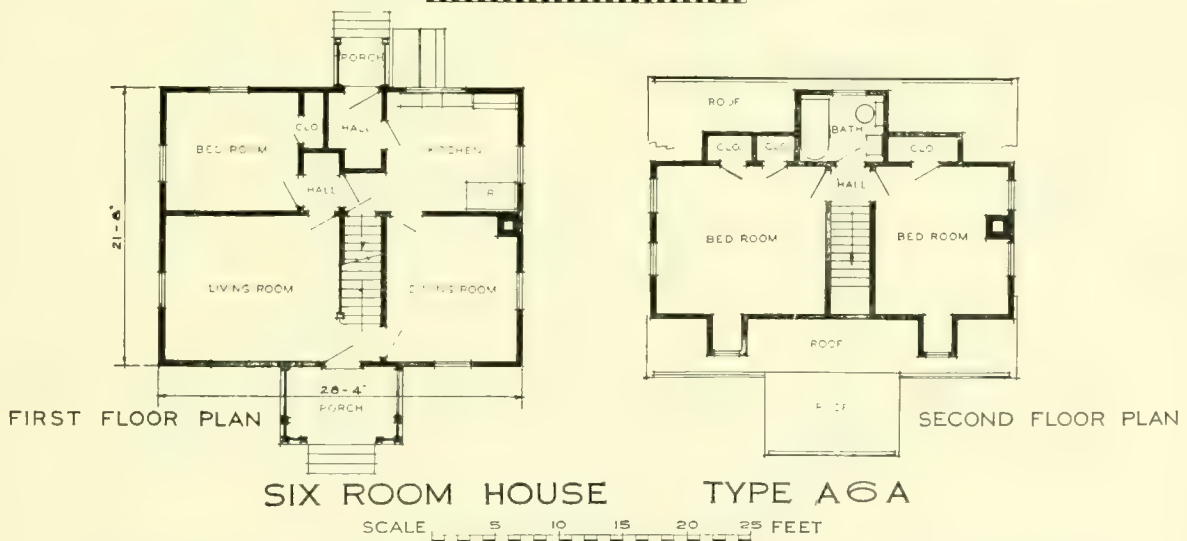
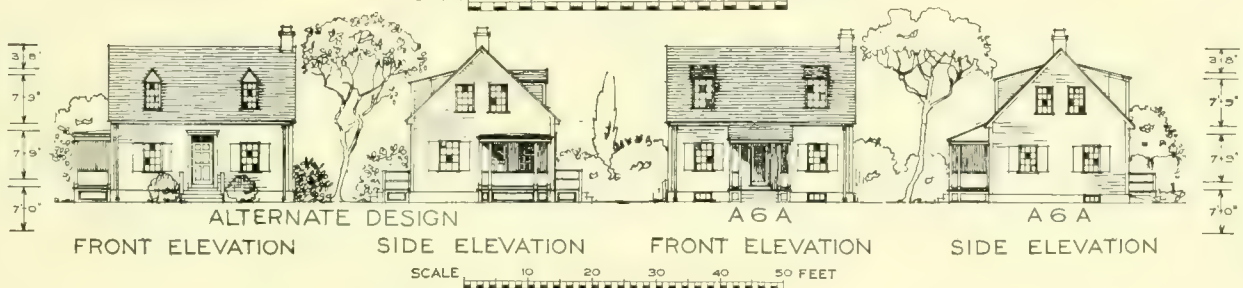
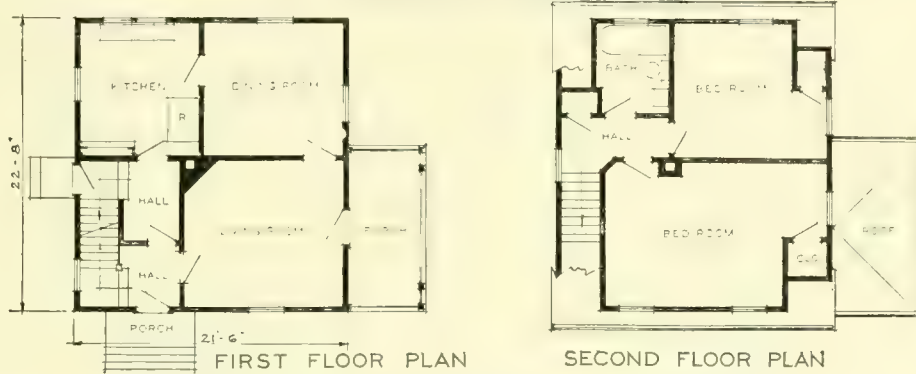
SIX ROOM SEMI-DETACHED HOUSES TYPES B6A AND B6A R

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT QUINCY MASS

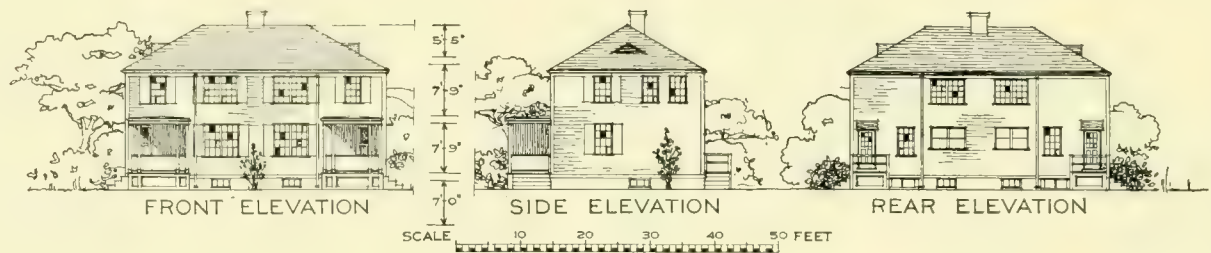
ARCHITECT

J E MC LAUGHLIN

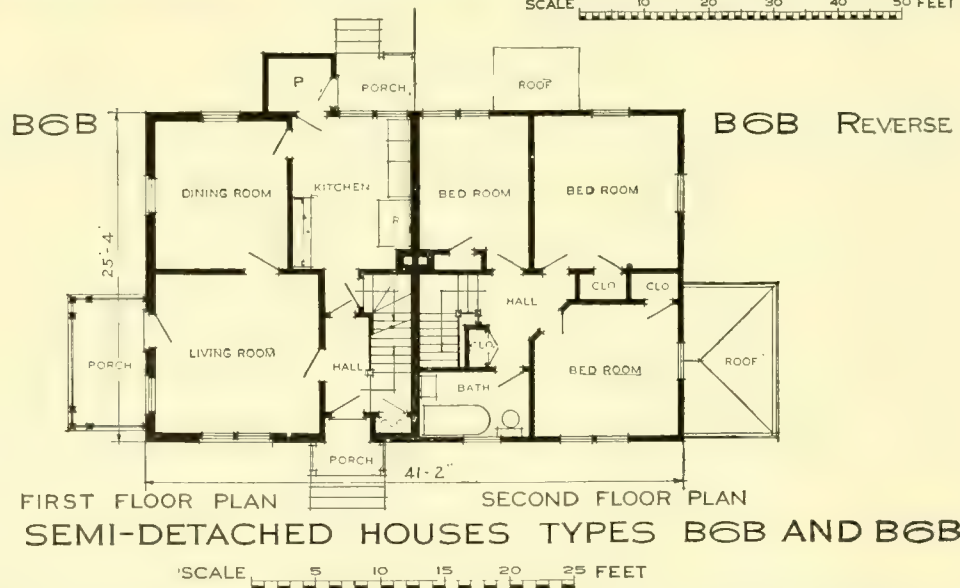
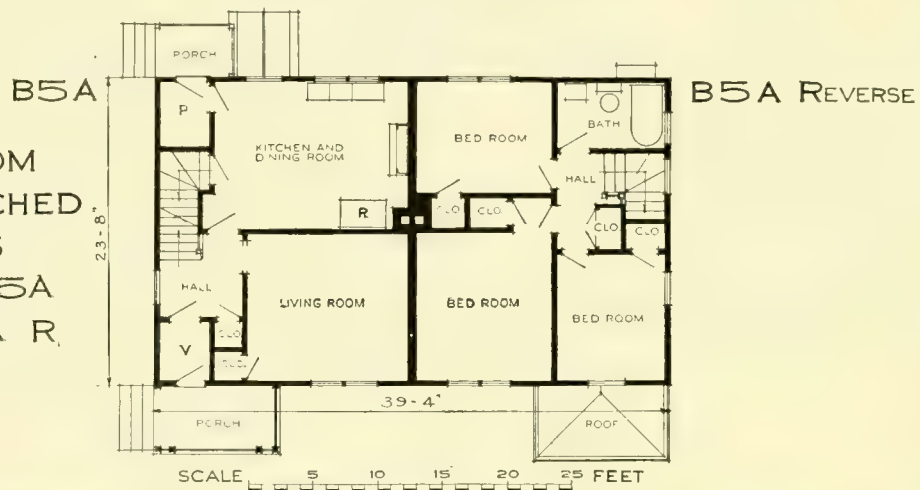


UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT QUINCY MASS

ARCHITECT J E MCLAUGHLIN



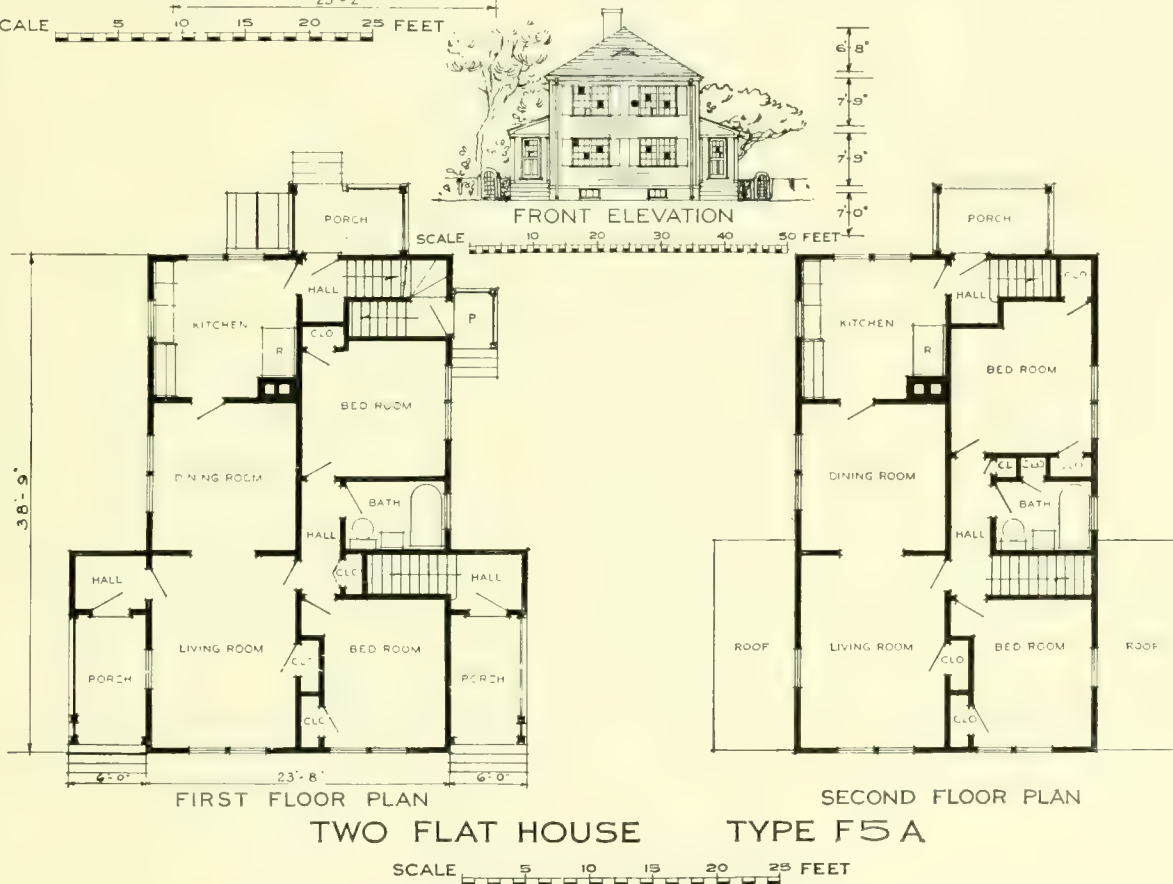
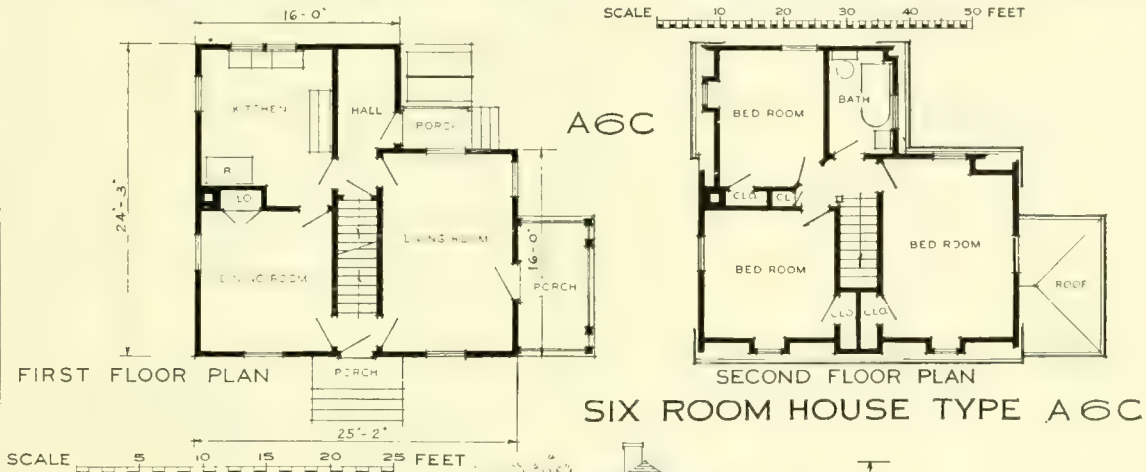
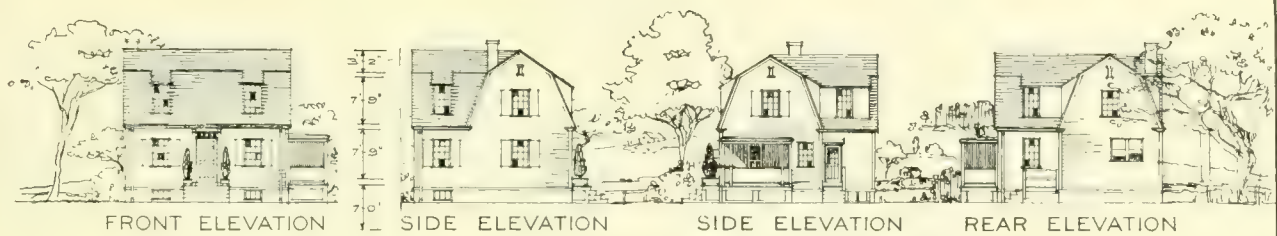
FIVE ROOM
SEMI-DETACHED
HOUSES
TYPES B5A
AND B5A R.



SIX ROOM SEMI-DETACHED HOUSES TYPES B6B AND B6B R

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT QUINCY MASS

ARCHITECT J E MC LAUGHLIN



UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT QUINCY MASS

ARCHITECT J E MC LAUGHLIN

ROCK ISLAND DISTRICT (PROJECT NO. 246).

(Includes Rock Island, Moline, and East Moline, in Illinois; and Davenport and Bettendorf, in Iowa.)

The five cities mentioned above are located on the banks of the Mississippi River, which here flows from east to west. Disregarding political boundaries these form one industrial community with over 100,000 population, and the center is the island of Rock Island, with its important Government arsenal. Topographically the five communities are similar; first the comparatively flat land by the river side; next the steeper slopes of the bluffs, on the Illinois side, often too precipitous for building, and then the gently rolling upland above the bluffs, here and there broken by sharp ravines.

The district is well served by three railroads; the main line of the Chicago, Rock Island & Pacific, and important branches of the Chicago, Milwaukee & St. Paul, and the Chicago, Burlington & Quincy. Most of the industrial plants are on the lowlands near the railroads.

The principal war industry is the varied work of the great United States arsenal on the island, employing 1,800 prior to the war, 50 per cent married; but in April, 1918, 12,000, 80 per cent married. Most of the employees could be classed as semi-skilled. In addition to the arsenal and other plants in the central part of the district there is at East Moline the agricultural implement plant of the John Deere Manufacturing Co. and the Root & Vandervoort Co., making guns for the Navy, shells for the Army, and other war products, and, at Bettendorf, the Bettendorf Car Works, making steel freight cars.

It was early decided that the housing shortage at the small town of Bettendorf was least serious and could well be taken care of by houses in Davenport. For the plants at East Moline, several miles from the arsenal, local housing was provided. The balance of the new housing was to serve the arsenal only. As no site could be found within walking distance it was necessary to use the local street railway system, which was assisted by the corporation in improving its service.

On account of the location of the industries to be served, and the available street railway lines and utilities, ten separate housing sites were chosen.

On the north side of the river in Davenport three sites were chosen, the Park Lane and King tracts

north of the city and the McManus tract, southwest. The first two of these, it was anticipated, could help solve the housing situation of the neighboring smaller town of Bettendorf. Except at the McManus tract no considerable open areas were provided, but existing public grounds were depended upon.

On the south side of the river in the city of Rock Island there are four groups, three of them (B, C, D) almost contiguous, and the fourth (A) six blocks west, all in the outskirts of the built up section of the city. In Moline there is one site slightly farther out from the town, and in East Moline two sites, the Deere tract east of town and the Highland tract, south.

Most of these tracts are on the bluffs away from smoke and dirt, but not so far removed that they lose the benefit of town utilities. The soil is fertile loam, underlaid by impervious clay subsoil and stratified limestone, particularly on the sites nearer the edge of the bluffs, which are largely composed of this rock.

The character of construction required was detached and semidetached wooden houses of permanent character. All but one of the tracts were so comparatively well served by existing stores and schools that none were contemplated in our projects. The surrounding development was either residential of a medium class or open lands.

The houses are single and semidetached and of small size, and generally facing on existing or previously platted straight streets, so that there was little opportunity for variation from the common method of building and arrangement, though some effort toward it was made in the selection of building types and setbacks.

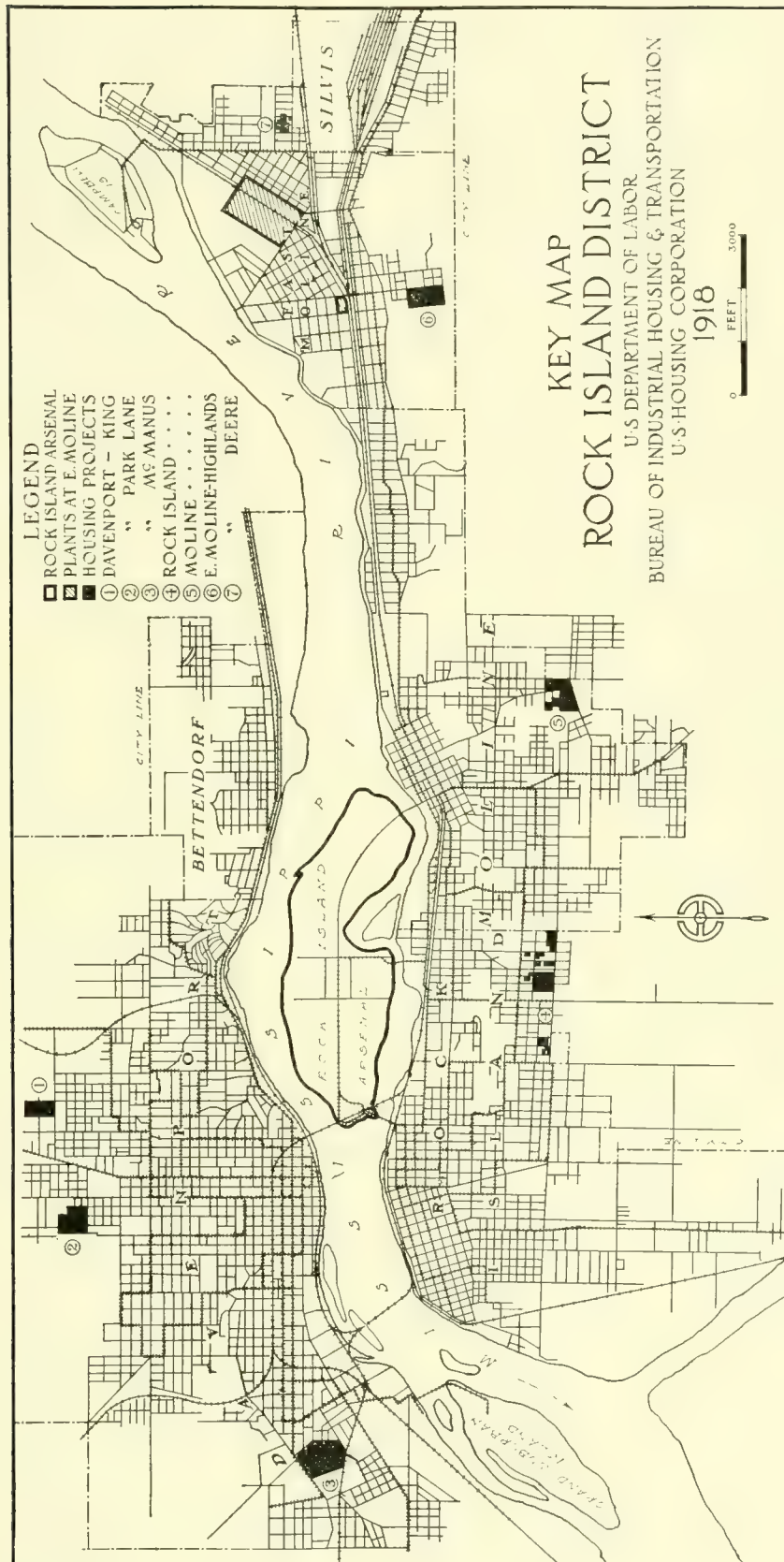
City of Davenport, Iowa.

PARK LANE TRACT.—Area planned: 15.66 acres. Housing planned: Detached houses, 79 families; semidetached houses, 12 families. Total, 91 families.

KING TRACT.—Area planned: 20.23 acres. Housing planned: Detached houses, 100 families; semidetached houses, 20 families. Total, 120 families.

(Projects discontinued. For further information see tables, Chap. IX.)

The location of the Park Lane tract in Davenport (H) is a favorable one, on the edge of an existing



neighborhood of a good type of workmen's houses and capable of easy development. It is six short blocks from the car line but with a prospect of the car coming nearer. It is accessible to water and sewer, though on the limit of extension of the latter, as it is on gently rolling land draining to the north. It is almost contiguous with the city's one large developed park, Vandevere Park, and in line with the general city growth.

The rectangular street arrangement of the vicinity was followed, as producing the maximum number of rectangular lots with Scott Street as the basic arterial street leading to the car line.

The King tract (I) was an open level site, except for a rapid rise in the northeast corner, with sewer, gas, and electricity on its south border and a car line in Brady Street a short distance to the west.

The tract is a rectangle bisected in each direction by a street, producing four blocks. It is connected with Brady Street by South Avenue on its south line.

THE McMANUS TRACT (J).—Area planned: 47.24 acres. Housing planned: Detached houses, 247 families; semi-detached houses, 20 families. Total, 267 families.

Housing constructed: Detached houses, 169 families; semi-detached houses, 20 families. Total, 189 families.

(For further information see tables, Chap. IX.)

This is by far the largest of the tracts developed by the Housing Corporation in the district, comprising an area of open, level land, 50 to 60 feet above the Mississippi River, on Telegraph Road on the west side of the city. Sewer, water, gas, and paving were in contiguous streets. A branch line of the Rock Island Railroad is close by to the south, with trains running direct to the arsenal. A school is adjacent to the east.

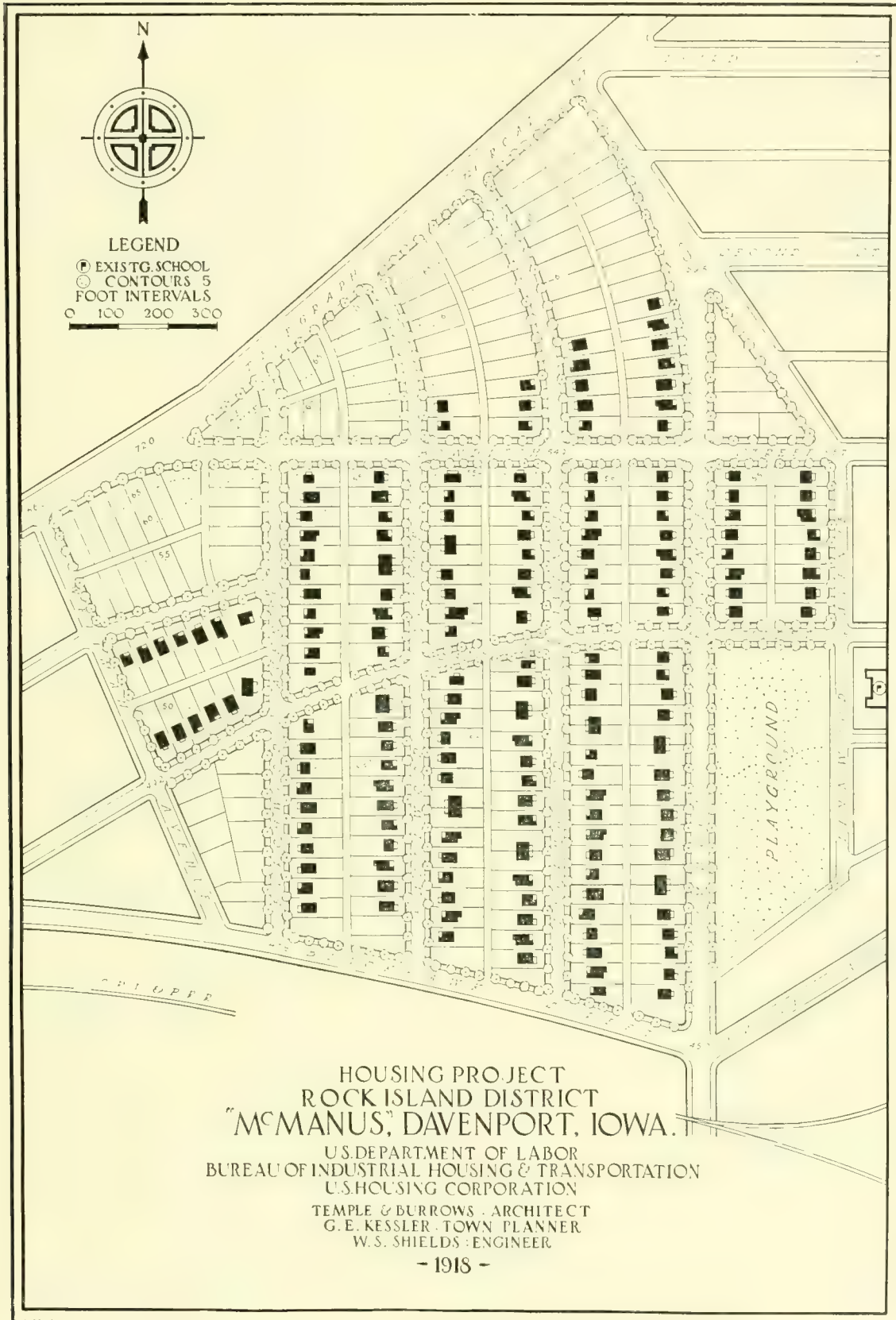
The strong local preference for alleys could not be overruled; a city ordinance prevents the collection of ashes and garbage except from such rear ways. They serve in addition for the location of poles and wires.

An entire block adjoining a small school already built on a small piece of land was dedicated for recreation purposes, the city park commission assuming obligation for maintenance. Otherwise no community features were developed, though a triangular block at the intersection of Bowditch and Telegraph Roads was reserved for possible future stores.

The street system is essentially a modified gridiron with the long dimensions of the blocks north and south. There are no through streets in this direction, on account of the railroad yards on the south, except for Elmwood Avenue, which was extended in cooperation with the city as a direct connection across the Rock Island Railroad. Through traffic on east and west lines was provided for by the extension of Hancock Avenue and Bowditch Street through the property. The curve of Hancock Avenue will be a pleasant variation from the neighboring straight streets, but it is not effective now, and never will be entirely effective because the houses face upon and are parallel to the minor streets, and thus there is no curving line of house fronts to reinforce the curve of the roadway. The same is true of the curving Blackhawk Street. It would have been inadvisable to front houses on Blackhawk Street because of the presence of the railroad on the opposite side, even though a narrow park strip was created against the railroad for planting it out and to prevent use of Blackhawk Street as a teaming outlet from freight sidings. There were obvious practical objections also to a lotting plan that would provide for houses fronting on Hancock Avenue. But the net result is that these two curving streets do not now in execution noticeably alter the appearance of the development from that of a regular gridiron plan. The curved portions of the transverse streets, north of Bowditch, will be very effective in time, but they are not built on in the initial development.

If, after looking at the houses built at Bath, Me., we view those constructed at Davenport, we note the extreme cases of a most important element of designing on an extensive scale. At Bath the houses tend toward too great uniformity of exterior; at Davenport the houses are too dissimilar in appearance, due to the fact that with 8 plan types, 23 different exteriors face the streets.

There are two types each of four and five room bungalows, two types of one-and-one-half-story five-room houses, and a type of six-room house, as well as a four-room house, semidetached. Then, too, the great variety of colors used tends to increase the general unrestfulness. Whatever the necessity for houses containing different numbers of rooms may have been, there should have been greater similarity in exterior. This with uniformity

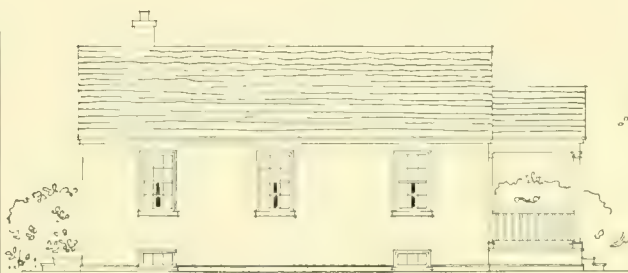




FRONT ELEVATION



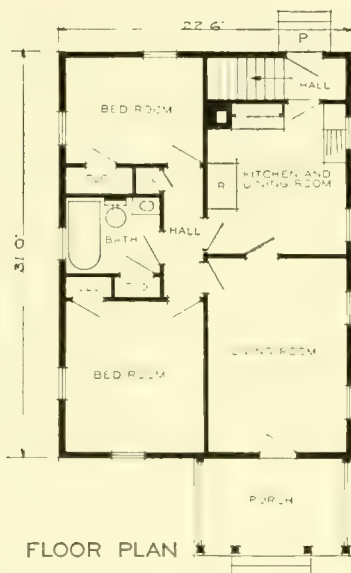
FRONT ELEVATION



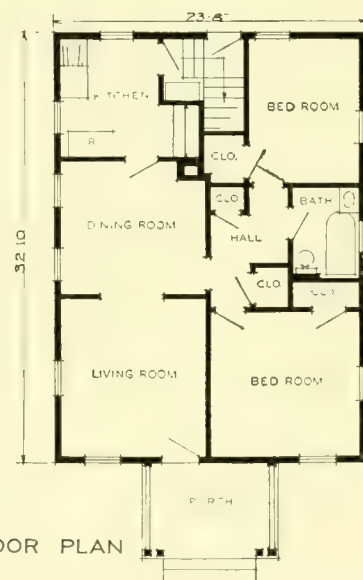
SIDE ELEVATION



SIDE ELEVATION



FLOOR PLAN

FOUR ROOM BUNGALOW
TYPE 550 4

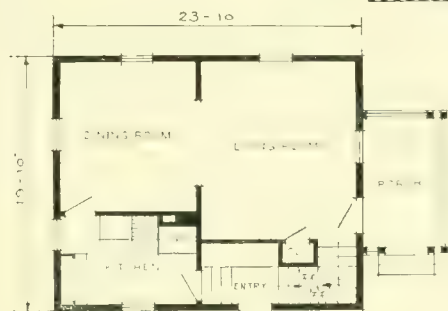
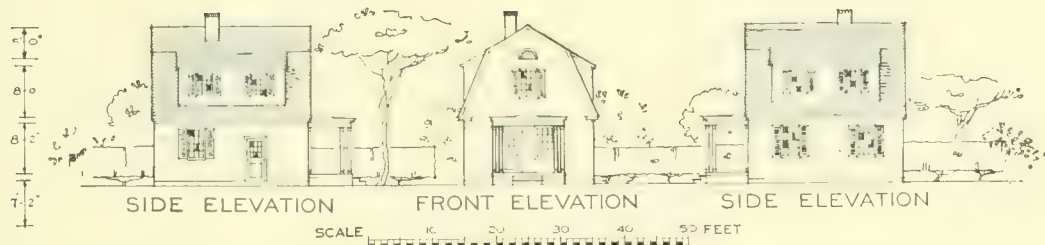
FLOOR PLAN

FIVE ROOM BUNGALOW
TYPE 553 3

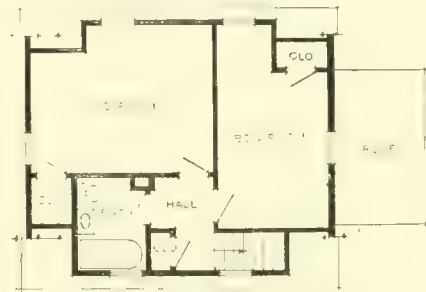
SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT DAVENPORT IOWA

ARCHITECTS TEMPLE AND BURROWS



FIRST FLOOR PLAN

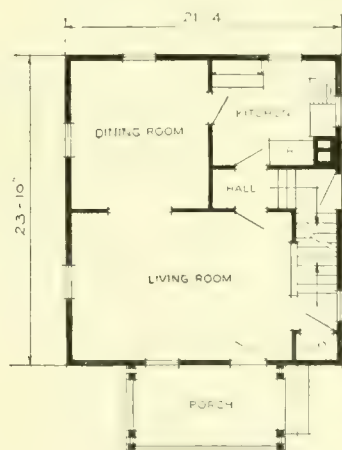
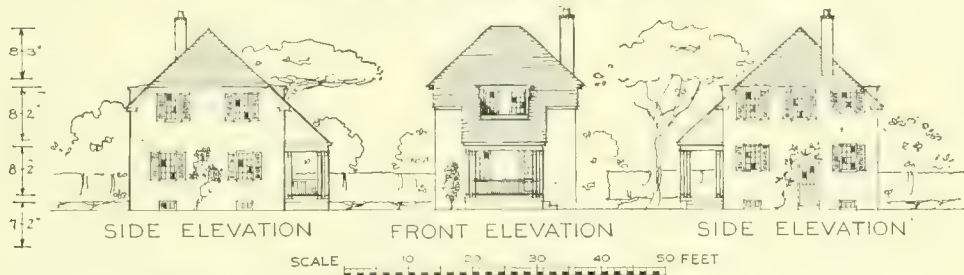


SECOND FLOOR PLAN

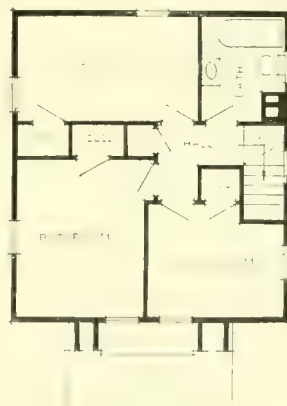
FIVE ROOM HOUSE

TYPE 554-6

SCALE 5 10 15 20 25 FEET



FIRST FLOOR PLAN



SECOND FLOOR PLAN

SIX ROOM HOUSE

TYPE 556-3

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT DAVENPORT IOWA

ARCHITECTS

TEMPLE AND BURROWS

in cornice and roof line would have given a greater sense of repose to the development. Finding that one or two types of a distinctly different style might be necessary these should be used sparingly or even better, partially segregated and their details changed so as to avoid monotony.

One does not expect unity in a number of houses erected by different owners, but it is expected to some extent in groups designed by the same hand in a development which has been studied in its entirety. This, however, must be said, that the custom of the vicinity seems to lean toward dissimilarity rather than uniformity in the design of rows of detached houses.

The individual houses themselves are excellent; the No. S554 house with the gambrel roof being specially good in its proportions, with the little bungalow (No. S551) a close second, and had it not been for the miserable-looking mouldings substituted, perhaps under war necessity, for those drawn by the architects, all the designs would have proven to be most admirable. Closing one's eyes to these details, one is impressed by the careful study which has been given to the houses. No attempt has been made to compress more into the houses than the houses required. Stucco, shingles, and clapboards have been used to good effect on the exteriors.

The absence of washtubs in an otherwise complete equipment of plumbing fixtures is noticeable, but this is because of the general use in the district of the automatic washing machine, provision for which has been made in cellars by supplying a waste in the floor, hot and cold water, and an electric outlet.

The criticism of the general design of the Davenport project is applicable to the development at Rock Island, Moline and East Moline. The houses lack unity of appearance.

There are four and five room bungalows (two types of the latter); two types of five-room one and one-half story houses, a six-room house and a separate type of five-room semidetached house—eight types in all and seventeen different elevations facing the streets.

Individually the houses are good, the semidetached houses being specially interesting. As at Davenport, these houses are of clapboard, shingle or stucco, and in some cases stucco and shingle or clapboards in combination. All are set low and in

most cases without water tables. Had they been built somewhat higher from the grade, a saving of cost for excavation would have resulted without harm to appearance.

City of Moline, Ill.

Area planned: 19.60 acres. Housing planned and constructed: Detached houses, 103 families; semidetached houses, 14 families. Total, 117 families.

(For further information see tables, Chap. IX.)

The tract in Moline (E) is in the line of city growth, even though a little far out from the center. By way of Twenty-fifth Street, which crosses the tract, it is but two blocks from the Sixteenth Street car line leading to the arsenal. Twenty-third Avenue to the south has sewer, water, and a brick pavement.

The street system, which is newly designed, follows closely the trend of surrounding streets and is dependent especially on Twenty-third Avenue on the south and Twenty-fifth Street at the center.

City of East Moline, Ill.

DEERE TRACT.—Area planned: 3.52 acres. Housing planned and constructed: Detached houses, 17 families; semidetached houses, 10 families. Total, 27 families.

HIGHLANDS TRACT.—Area planned: 19.99 acres. Housing planned and constructed: Detached houses, 79 families; semidetached houses, 20 families. Total, 99 families.

(For further information see tables, Chap. IX.)

The Deere tract in East Moline (F) is a somewhat scattered development on low land, but within easy reach of the factory of John Deere & Co. by way of Seventh Avenue. The streets had sewers, water, and sidewalks. The houses already in the locality were those of small-wage workers.

The Highlands tract in East Moline (G) is on the edge of the bluff, only one-fourth mile from the Root & Vandervoort factory by way of Seventh Street, which leads to it directly. Sewer, water, gas, and pavement are in Seventh Street. A good grade of workmen's houses are to the north.

The street system is based on Seventh Street, the east boundary of the tract, while Sixth Street, on the west side, follows the edge of a wooded valley.

None of these developments on the south side of the river are particularly interesting in general layout, because in most instances existing or proposed straight street lines and rectangular blocks were followed.

City of Rock Island, Ill.

Area planned: 34.55 acres. Housing planned and constructed:
Detached houses, 183 families; semidetached houses, 34 families.
Total, 217 families.

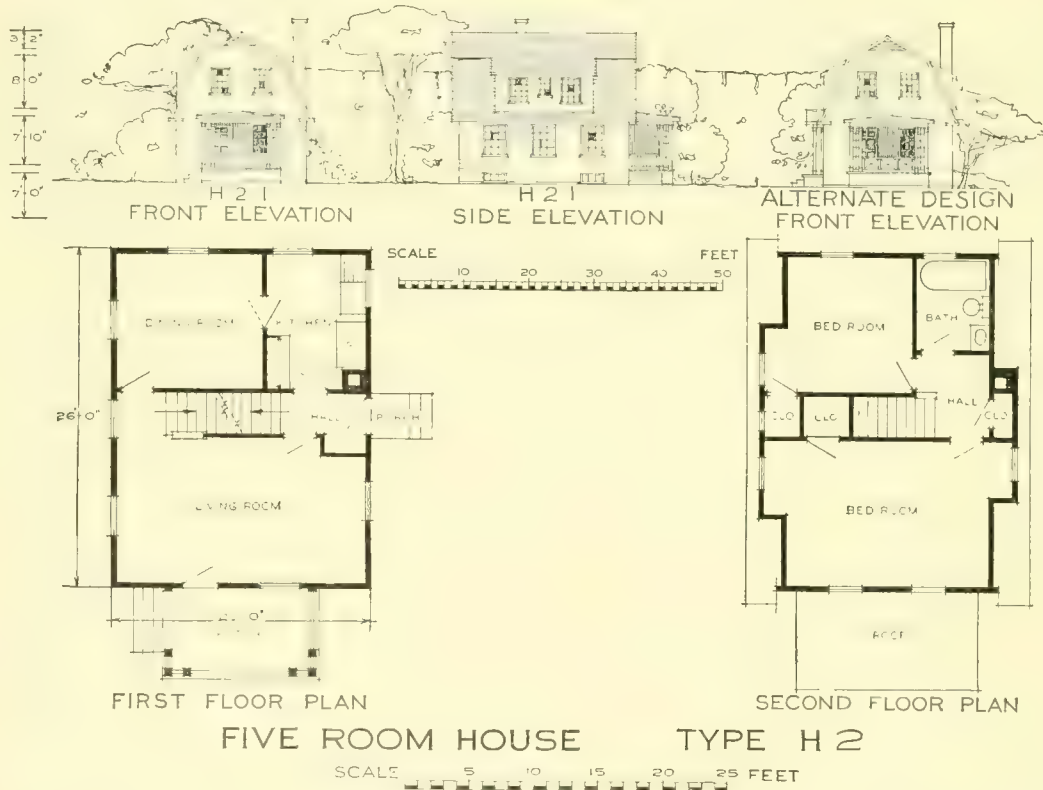
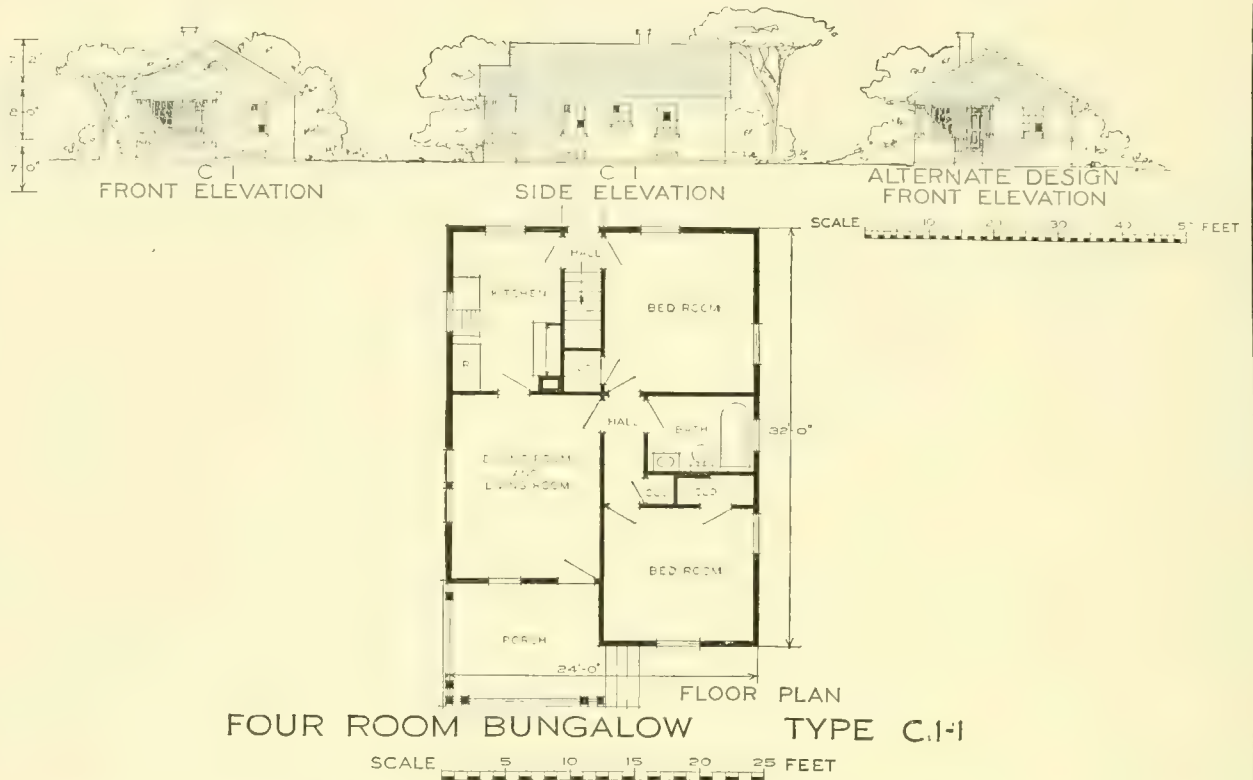
(For further information see tables, Chap. IX.)

Tracts B, C, and D are practically contiguous, but A is six blocks directly west on similar ground. All are on high ground, not far from the edge of the bluff, and on property with the streets already developed. The neighborhood is excellent. In most

of the nearby streets are sewers, water, sidewalks, and electric light. The Fourteenth Avenue car is four blocks away.

The development consists of scattered groups and blocks of houses, because it seemed that if located farther south where an unbroken development could be built, much special construction of utilities would have been necessary, some time would be lost, and not enough gained in better appearance.





UNITED STATES HOUSING CORPORATION
 DEVELOPMENT AT MOLINE ILL
 ARCHITECTS CERVIN AND HORN

SEVEN PINES, VA. (PROJECT NO. 1368).

Area planned: 252.17 acres. Housing planned: Detached houses, 863 families; dormitories, 3,230 persons; hotel, 60 persons. (This provides for 103 families in detached houses, contemplated at one time but not represented on the general plan.)

(Project discontinued. For further information see tables, Chap. IX.)

In the spring of 1918 E. I. Du Pont de Nemours & Co., under Government contract, began to erect a great "bag-loading plant," for placing in bags carefully standardized explosive charges, about 7 miles east of the city of Richmond, Va., and situated in the vicinity of a famous battle field of the Civil War, known as Seven Pines. The trees are still standing from which the place was named, and across the site selected for the munition plant the lines of the old trenches could still be traced. The plant was supposed to be ready for operating by September, 1918; 3,000 women and 1,000 men were to be employed. There were no existing accommodations nearer than Richmond.

Investigation showed that there was a considerable amount of available housing in Richmond, but the transportation to the plant was very inadequate. The Housing Corporation later purchased the Richmond & Seven Pines Street Railway line, and made arrangements for its operation by the Virginia Railway & Power Co., which began operating the railroad on September 11 and much improved the service. When the construction of the project by the Housing Corporation was under way there was also installed a special train service from Richmond on the Southern Railroad, the Housing Corporation paying the fares of the workmen.

Housing near the plant was in any case necessary because there might be two or even three shifts of workers, most of them women, and the long journey, partly by night, back to Richmond was too great a difficulty. The site acquired for the development of the bag-loading plant and for the building of the houses for the workers consists of some 1,700 acres of flat land. It is situated on top of a divide between the Chickahominy and James Rivers, but because of the extremely fine silty soil and level topography, it was practically a swamp when it rained, before our construction began.

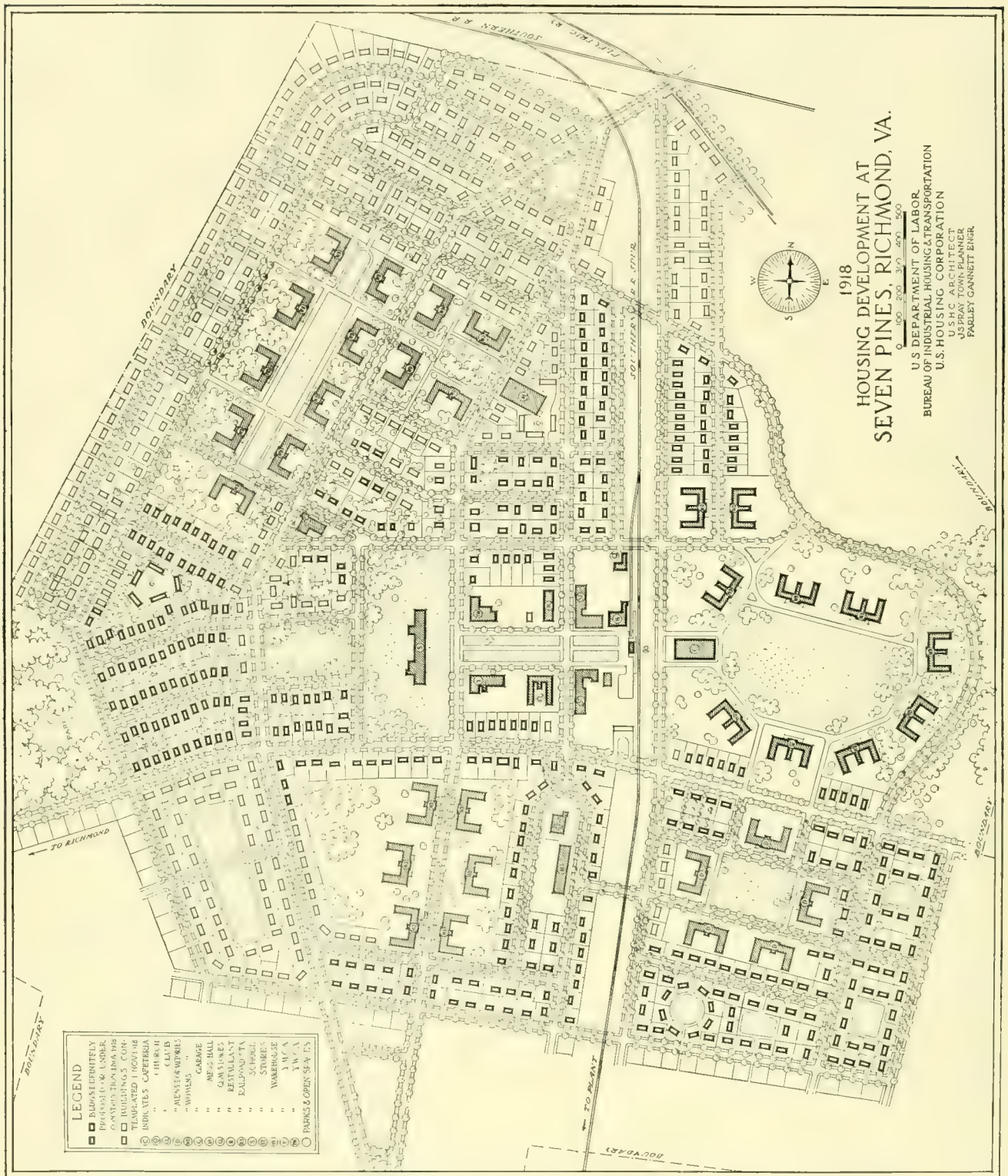
It was necessary to ditch and drain to a very considerable extent. The soil is not such as encourages a heavy growth of grass or verdure and much of the land was covered with a sparse under-

growth which had to be removed. The housing site lies on both sides of the Williamsburg Road and extends from the village of Seven Pines to the village of Fair Oaks. Part of it is in a fairly dense growth of pines, the rest on cleared land.

When those living in Richmond and elsewhere who were to be transported to the plant had been allowed for, it was still necessary to provide housing for approximately 3,000 workers. A very considerable number of these would be women and girls, who could best be housed in dormitories. Some 500 houses were to be built for foremen, Government inspectors, and the higher class of skilled workers. Some of the houses were to be of permanent construction, because it was at the time thought by the Ordnance Department that the Seven Pines bag-loading plant would be continued after the war.

On July 1, 2, and 3, pursuant to requests from the Army, an investigation of the site was made by representatives of the Housing Corporation, including the district engineer and the project town planner. Since it was evident that the houses constructed would be mostly temporary and as the maximum speed was necessary, the engineering work, and the architectural work and general superintendence, were done respectively by the Engineering Division and by a special division of the corporation for rapid design and carrying out of mostly temporary house construction. A site north of the Williamsburg Road was recommended for the permanent housing and one south of that road for temporary housing. Preliminary plans of houses were submitted by the Dupont Co., which were revised by the Housing Corporation. On August 8 100 temporary ready-cut bungalows were requested for immediate use by the Dupont Co. On August 10 a contract was let for these houses. The general layout plans and specifications being completed, the general contractor's bids were asked on August 23. The contract was let on September 11.

The general plan for operation was first to erect the 100 houses for immediate occupancy of the Dupont Co.'s employees, who were working at



the bag loading plant. These were temporary bungalows and were designed for occupancy only during the war, while the balance of the village might be considered as permanent. This temporary portion was to have all public utilities, although the installation of these was held up until let with the general fixed fee contract. To facilitate action on the 100 houses of the first contract, where duplication occurred all material was bought "ready-cut" at the factory, and shipped ready to be assembled on the ground. Utilities and housing started at practically the same time. The demands of the plant being uncertain, and being differently estimated by the Ordnance Department at different times the plan was made to provide for more housing than was surely needed. Indeed at one time the scheme covered more than is shown on the plan here given. The following facilities were definitely undertaken, however, when the construction work began. Besides the dwelling houses in the village, which consisted of 375 bungalows and 24 supervisors' houses, there were 10 large dormitories, housing 95 each, men's hotel with 60 rooms, large cafeteria, short-order restaurant, quartermaster's shop for general village repairs, and a retail commissary for general village use, 8 five-car garages, 1 post office, 1 drug store, Y. M. C. A. and Y. W. C. A. for recreation purposes, and an 8-room schoolhouse—in all, 427 buildings.

Besides these there were erected construction buildings consisting of mess hall, bunk houses, and warehouses. A large number of workmen and the office force made use of the mess hall. About 150 of the workmen made use of the bunk houses, but many lived in Richmond. These men were hauled back and forth from Richmond in the early days of the project on the work train used by the Foundation Co., which was building the bag-loading plant, but later a special train was put on to take care of our own workmen. Two railroad sidings were installed for the use of this passenger train and for handling freight.

The water supply for the housing site was to come from two driven wells, one of which had been already sunk in order to determine the amount and constancy of the underground supply. For reservoir purposes a steel tank holding 100,000 gallons was to be built.

Investigation showed that, because of the extremely fine character of the subsoil, subsurface

drainage was impossible. Because of the flatness of the topography rain water falling on the surface of the ground only slowly drained away, making an almost impassable mire, which took days to dry out. It was therefore determined that a system of combined sewers would be the proper one for this location. These combined sewers were designed on the basis of 1 inch of rainfall per hour.

The rainfall in this district at times is very heavy, Richmond having rates as high as 6 inches per hour for 20 minutes or more. However, as stated before, the topography was very flat, the run-off very slow, and practically no cellars were to be provided for the housing development. It was considered, therefore, that the sewers as installed could without any inconvenience to the people living in the houses run under pressure, and that while there might be short periods of inconvenience because of flooded conditions of the streets, still the very great expense involved in designing the sewer system on a higher basis than 1 inch rainfall would not be justified.

The road system is based on the existing Williamsburg Road, Ordnance Road, the railroad, the site of the railroad station, and a reasonable grouping of the public buildings near it. Long, straight streets were avoided, because they gained nothing in general directness of access from the site to the plant, and because, especially with the simple bungalows, the long, open vistas would be very monotonous.

The houses were small and without much architectural variety, but, as they did not require very close approach by vehicles and as the land was cheap, it was possible and desirable to get variety by different groupings of the houses, even at some cost of space. There is a question, however, whether it is desirable to place so many houses broadside to the street, as was done, for instance, in the southeastern part of the project, since it increases the necessary length of sewer and water mains and the length of streets. The arrangement of the bungalows around interior courts is worthy of notice. There is no doubt, of course, that this, together with the occasional ample frontage of the bungalows on the street, added much to the pleasant appearance and general "liveableness" of the development. It should be borne in mind in considering this scheme, too, that the houses looked about as well from the rear as they did from the front.

Good irregular arrangements and small local open spaces were therefore the more readily obtained. The dormitory buildings lent themselves better to regular grouping, but with them, too, some freedom of arrangement seemed desirable, for we did not believe that these obviously cheap and largely temporary buildings were good material out of

which to make a rigidly formal design, even where the local circumstances might otherwise suggest such an arrangement. For convenience and for appearance we arranged the dormitories about considerable open spaces, and in most cases we managed not to use the roads or paths of these spaces for much through traffic.



SHARON, PA. (PROJECT NO. 138).

Area planned: 48.26 acres. Housing planned: Detached houses, 199 families; semidetached houses, 16 families; total, 215 families.

(Project discontinued. For further information see tables, Chap. IX.)

Sharon, Pa., is located in the Shenango Valley, 50 miles south of Lake Erie and close to the Ohio State line. The population was about 25,000 in 1918. Sharon is in the midst of an industrial district of five or six towns with an aggregate population of about 45,000.

In this district are located 23 or more factories which were doing from 50 to 100 per cent war work. With the exception of two brick concerns all of the factories were employed in the working of iron or steel. The industries are nearly all located in the lowlands adjacent to the Shenango River. There were employed about 17,500 men and it was desired to increase that number by 2,000. The district was already perhaps 1,700 houses short of its proper number for its population. Workers were sleeping in three shifts in the same room. The labor turnover per month was about 20 per cent.

There was unusually little difficulty in fixing on a site. The one chosen was much the best of all alternatives, and indeed had practically all the advantages and very few disadvantages. It is located in the eastern part of the city on the uplands. More land could be acquired for extension of the development if necessary. All utilities came within a short distance of this site. The surface is rolling and has good drainage to a small stream known as Pine Run, which passes along the north side of the development. The soil is a clay mixed with shale and some sandstone. The rock comes near the surface at some points. The ground-water level is low. The site is adjacent to the city and within reasonable distance of schools, churches, stores, and amusement places, and it was not considered necessary to construct any of these facilities.

The street system assumed its form almost inevitably, since it was plainly desirable to have streets parallel to the east and west boundaries of the property, streets running generally along the hillside, a curved road leaving a reasonable park area along Pine Run, and a general system so that there should be direct routes to the plant.

The source of supply of the waterworks system of Sharon is the Shenango River, and there has been sufficient quantity for all needs. A large storage reservoir is being constructed about 25

miles above Sharon primarily for the purpose of flood prevention. This will insure a sufficient supply of water for Sharon for many years to come. The water is contaminated by the discharge of oil, acid, and sewage of the adjacent towns, but after filtering and treatment with alum, lime, iron, and chlorine, the water is apparently quite satisfactory. The Sharon Water Works Co., a private corporation, proposed to construct all water-main extensions at their own expense.

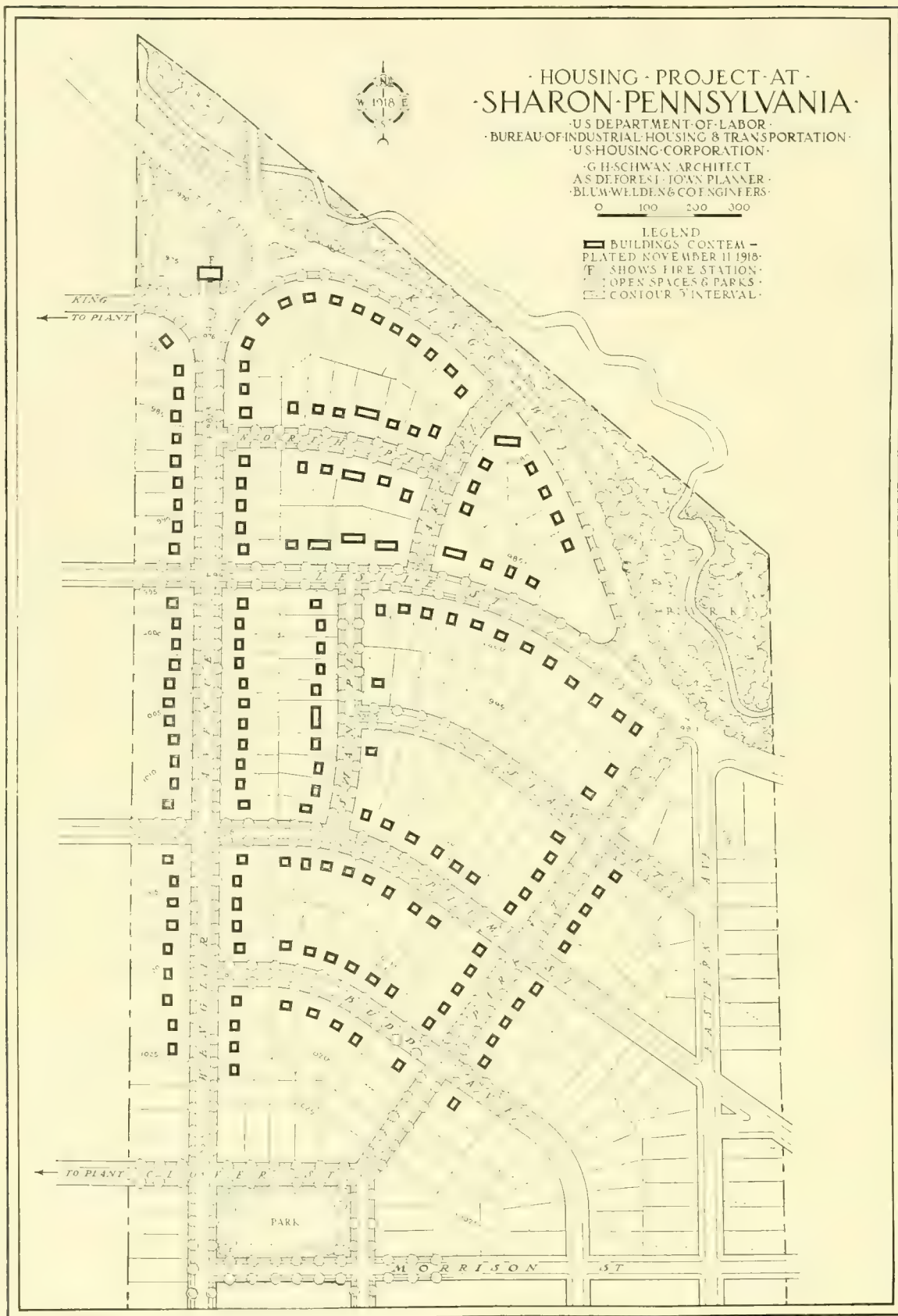
Storm-water sewers would not have been required. The present system in Sharon is a combined one, but the city has been notified by the State board of health that provision for a separate system must be made for all future work. The city at the time of the investigation was constructing a large outfall sewer which would give an outlet for the development. The sewage is discharged into the Shenango River without any treatment, but the State board of health had issued orders that a sewage-disposal plant be constructed to safeguard the water supply for towns and cities situated farther down the river. The city would pay the cost of storm sewers and for sanitary sewers over 8 inches in diameter laid in the development.

Natural gas is supplied by the United Natural Gas Co. The high-pressure regulator is located near one corner of the site, and extension to the development would have been easy. The company was prepared to make necessary extensions of mains and to construct the connections, at their own expense, up to 50 feet for each house owner.

It was customary for the owners of property to advance the cost of the electric lighting extensions, which would be refunded in part during the five-year period following the construction.

Practically all the pavements within the city are of brick on concrete base. It was thought, however, that an asphaltic macadam would be acceptable within this development and could be constructed at a less cost. Sidewalks were to be of concrete.

This project was well under way when the signing of the armistice caused its abandonment.



STATEN ISLAND, N. Y. (PROJECT NO. 130).

SITE FOR APARTMENTS.—Area planned: 0.77 acre. Housing planned: Apartment house, 36 families.
 SITE FOR HOUSES.—Area planned: 9.25 acres. Housing planned: Semidetached houses, 78 families.

(Project discontinued. For further information see tables, Chap. IX.)

At Staten Island the sites allowed for the placing of the houses on practically level lots. There was no change from the existing street system, and no practical opportunity for special interest in house grouping.

As in the case of most projects where skilled industrial married workers were employed a preference was made in providing housing for this class.

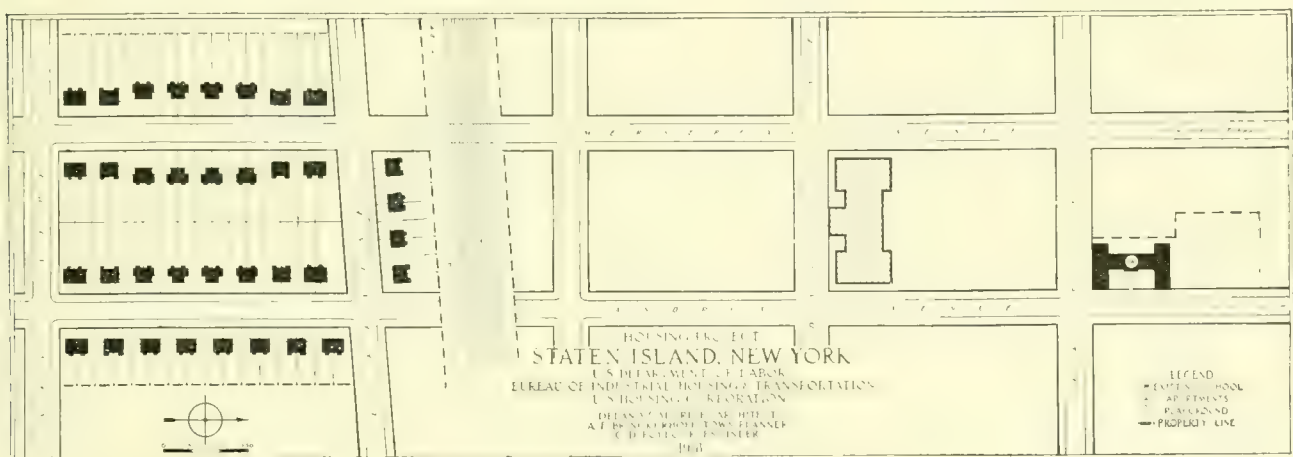
The demand was greatest for the six-room type of house, a demand corroborated by a canvass of the workmen, which resulted in having more than the full projected number spoken for while plans were in process of making. A further demand was for small apartments.

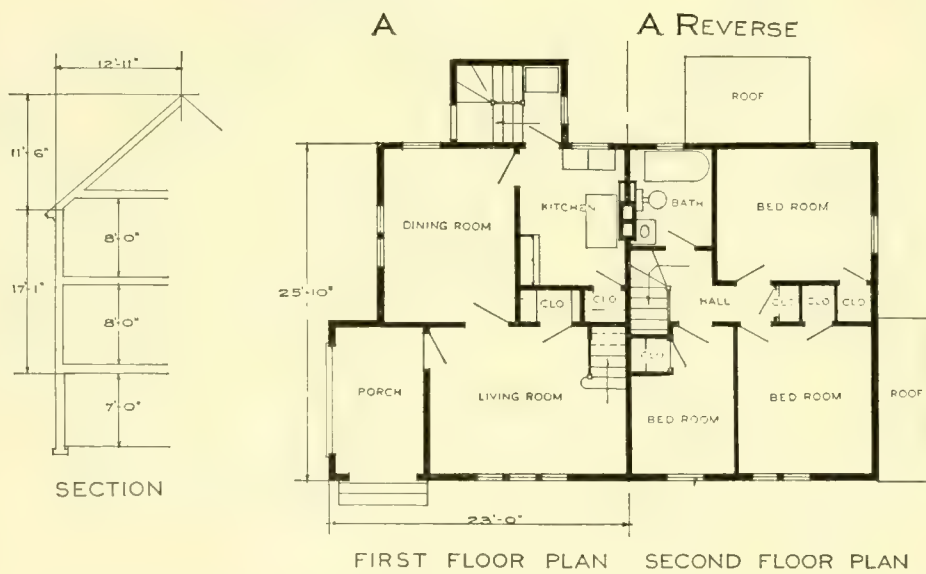
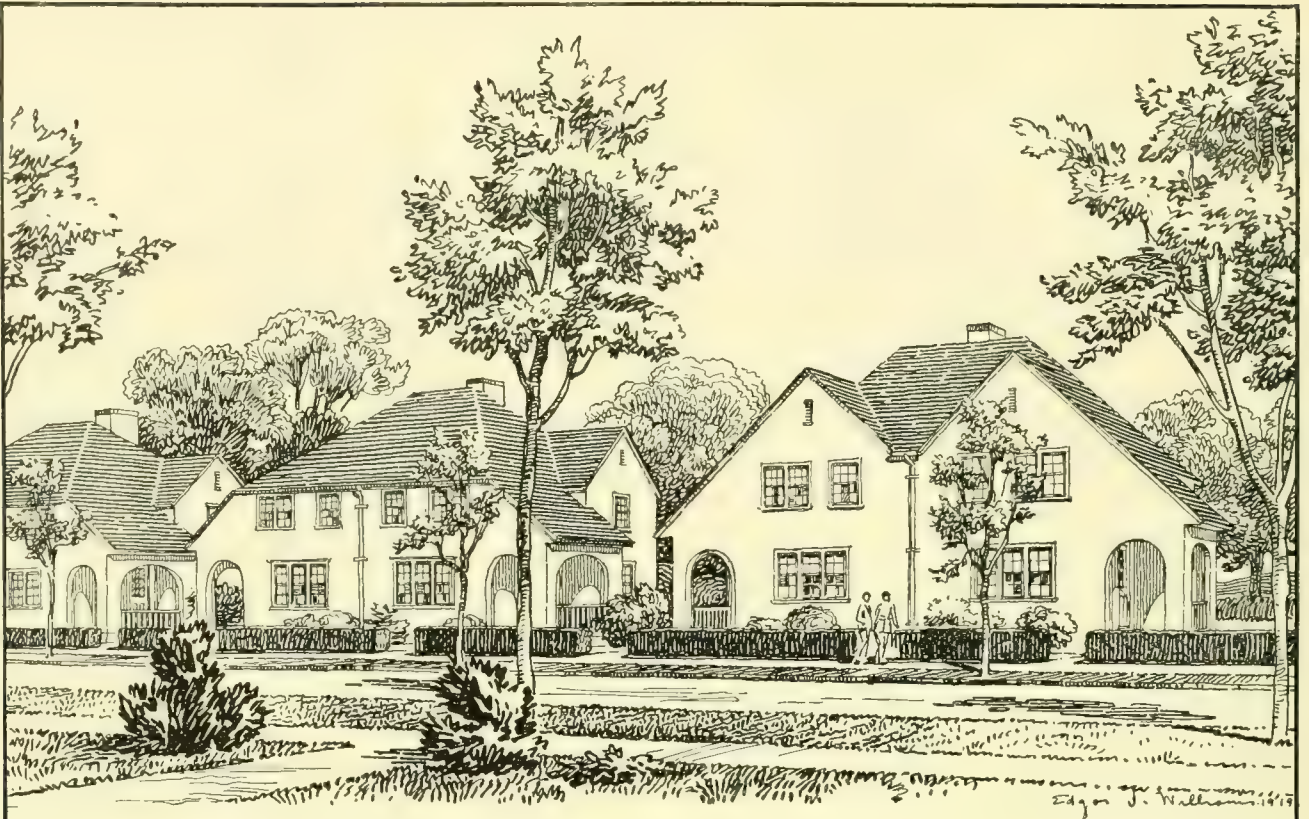
Five types of semidetached houses with six rooms each were planned. Besides these an apartment

house with apartments of three, four, and five rooms was planned for a separate site near by.

The houses were to be of the simplest construction, with wood frame, and stucco exterior on patent sheathing. Efficient use of space has been made throughout the arrangement of the interiors. In design they were normal, a characteristic being the high roofs, long gable lines, and the total elimination of flat roofs or decks. This elimination of decks makes for a tighter house and the consistent similarity of roof line gives harmonious simplicity of grouping.

Another characteristic of the design is the general incorporation of the porches in the body of the house, thus magnifying the impression of size of the house while simplifying the mass.





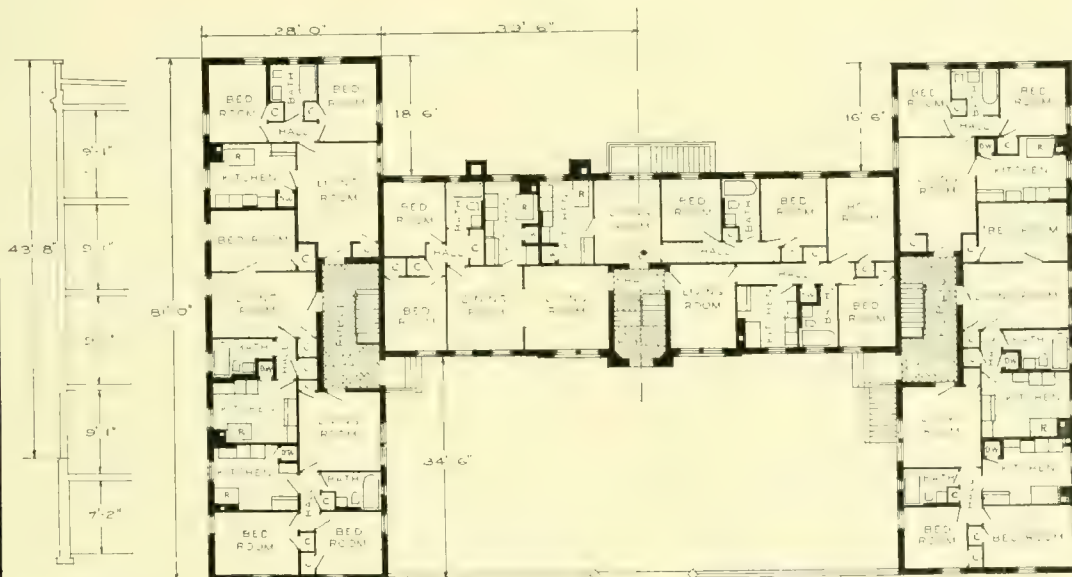
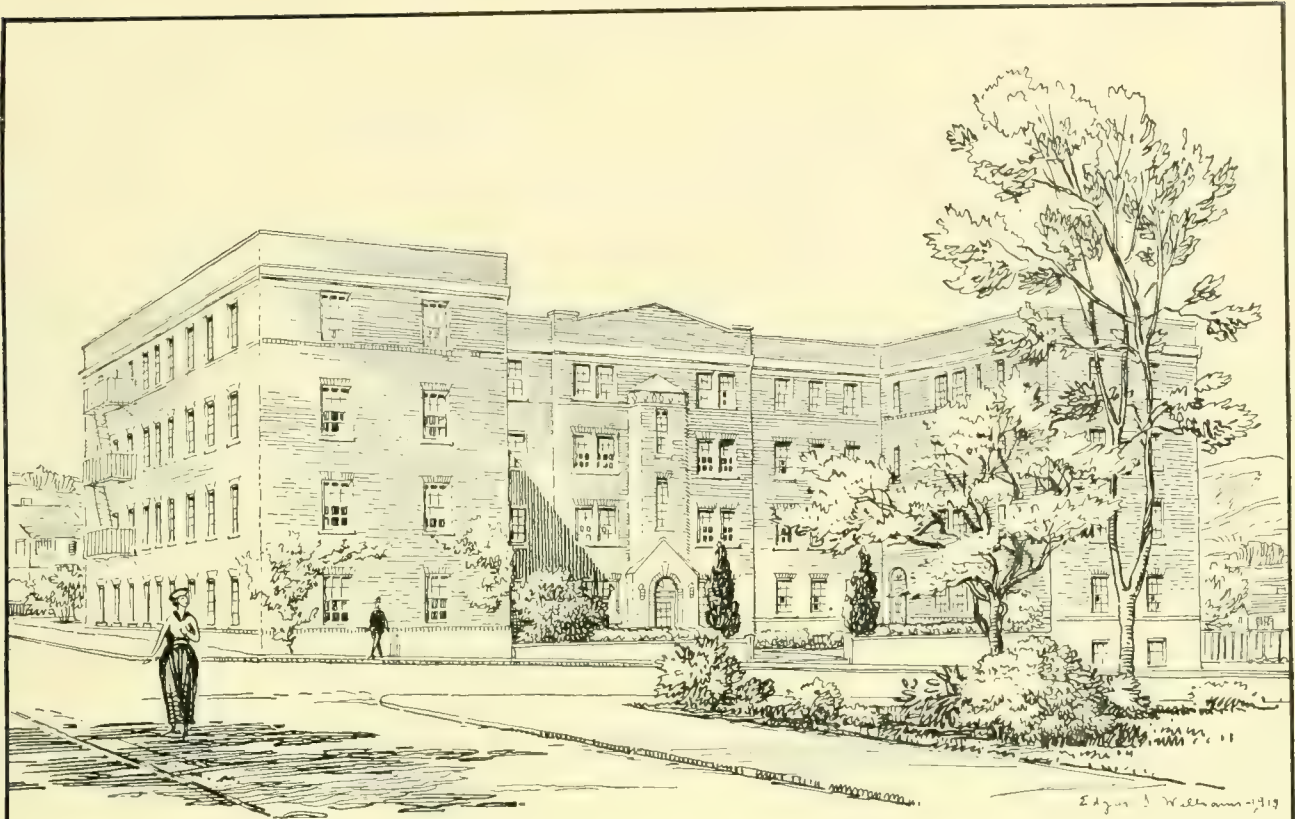
SIX ROOM SEMI-DETACHED HOUSES TYPES A AND AR

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT STATEN ISLAND N Y

ARCHITECTS

DELANO AND ALDRICH



SECTION

FIRST AND TYPICAL FLOOR PLAN
APARTMENT HOUSE

SCALE 10 20 30 40 50 FEET

UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT STATEN ISLAND N Y

ARCHITECTS DELANO AND ALDRICH

WASHINGTON, D. C.

The city of Washington suffered more than did most of the industrial towns by overcrowding during the war. The war emergency had increased enormously the number of civilian employees of the Government. Government offices came to occupy not only Government buildings but buildings all over town wherever space was available. The Housing Corporation for instance occupied the three upper floors of a large garage building.

Living quarters and eating places in town were almost intolerably congested, and transportation from the outlying residential districts was swamped by the increased demand, so that thousands of employees had to lose from an hour to two hours per day over the normal time spent on the street cars. The Civil Service Commission did a large amount of advertising, but much of their effort was wasted because the story of Washington's predicament had preceded it. Even after applicants had passed their examinations a large proportion of them declined places, and many who had actually come to Washington later resigned and returned home.

Governmental and local organizations set to work to overcome these difficulties by making existing housing available, but they found that the point of saturation was already nearly reached. The greatest need was for homes for married civilian employees and married officers ordered to Washington. Housing for the unmarried women war workers came next, on account of the inhospitable attitude of householders, who felt that while they were obliged to open their houses, men war workers would cause them less labor and annoyance. Then men of means who came for war work and others who came only "to see the game" offered exorbitant prices for ordinary quarters and encouraged the flagrant profiteering already prevalent. In the housing bill passed by Congress \$10,000,000 of the appropriation made on June 4, 1918, was to take care of the housing situation in Washington. The powers given the Housing Corporation by law included the right of commandeering either the temporary use or the permanent ownership of houses and land, as well as the building of new houses. The signing of the armistice, however, insured that conditions would grow no worse, before the corporation had gone to the full extent of its power.

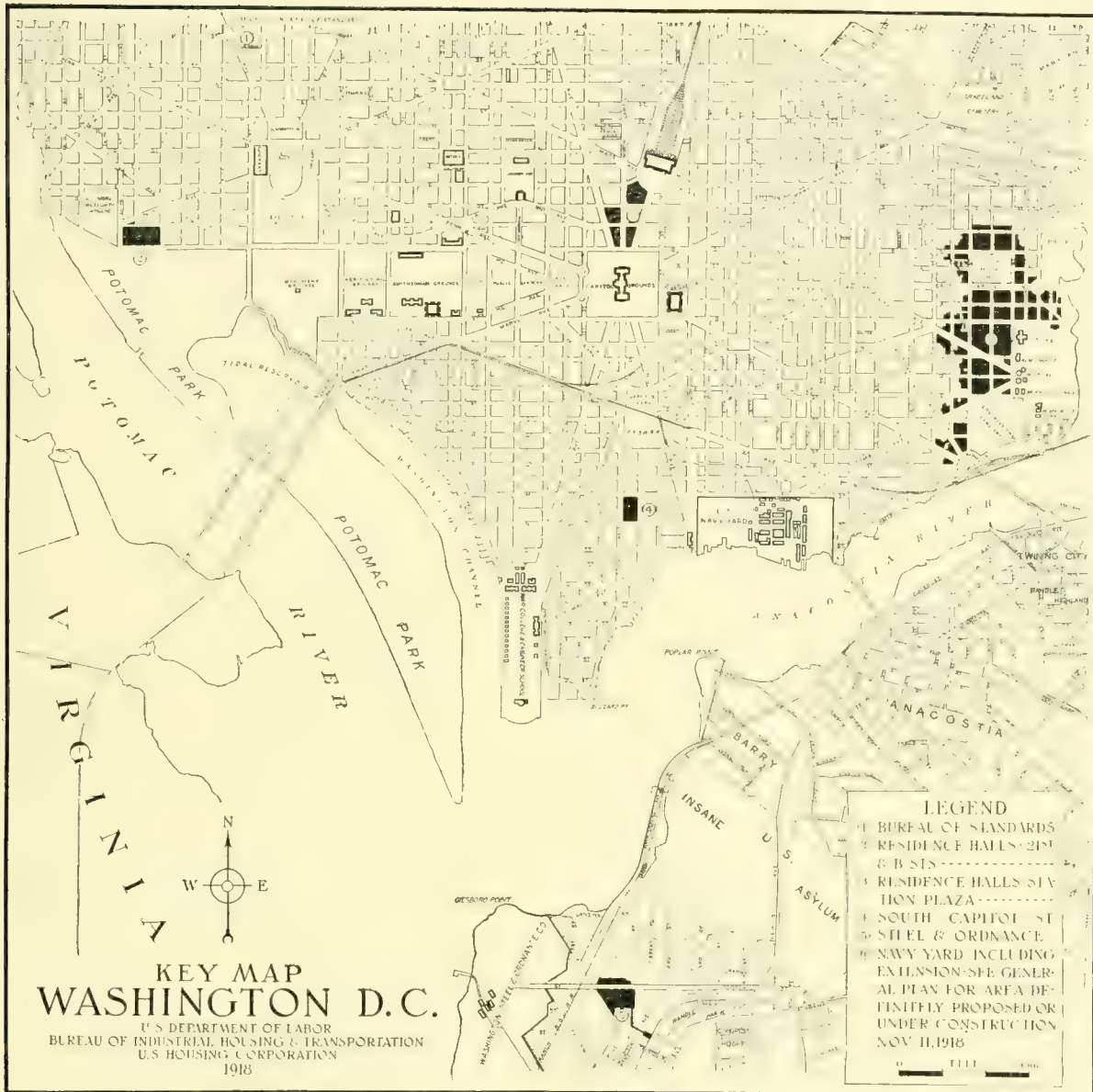
The regular work of the Homes Registration Division did much to relieve the situation. The commandeering of some houses which were being held vacant or not fully occupied gave a little relief directly, but had a considerable effect also by influencing other reluctant house owners.

Mr. John A. Beeler, consulting engineer for the Public Utilities Commission of the District of Columbia, reported on June 10, 1918, a plan for extensions and connections of the tracks comprising the present two competing trolley systems of the city. This report was accepted by the Utilities Commission as the basis for the proposed immediate improvements, with the implied protest of nonindorsement on the part of the two railway companies concerned. In a conference on June 24 of representatives of the Navy Department, the Public Utilities Commission, and the United States Housing Corporation it was agreed that no steps should be taken for the solving of the traction difficulties which did not have the approval of Mr. Beeler. Mr. Beeler's proposed plan included the so-called "Belt Line." The United States Housing Corporation had its engineer confer with Mr. Beeler with the result that arrangements were made to start improvements on a section of this line on Seventeenth Street NW.

This short link from Seventeenth and H Streets to Seventeenth and Pennsylvania Avenue NW. was designed to alleviate the great congestion in transporting employees from the north side of the city down to the new temporary war buildings near Potomac Park in the neighborhood of B Street. The proposition of the Housing Corporation to finance these extensions, to cost approximately \$150,000, was accepted by the Washington Railway & Electric Co.

Housing construction as planned for Government employees took two forms, first, temporary buildings chiefly for single workers, and, second, permanent houses, chiefly for families.

There was a prospective permanent demand for these latter houses after the war, both on account of the assured permanent growth of the city, not paralleled by building construction, and because of the number of houses to be vacated and destroyed under the provisions of the alley dwelling law.



"RESIDENCE HALLS."

Capitol and Union Station Sites (Project No. 54a).

Area planned: 16.61 acres. Housing planned and constructed: 12 dormitories for 162 women each; total, 1,944 women.

(For further information see tables, Chap. IX.)

Twenty-first and B Streets Site (Project No. 54c).

Area planned: 11.87 acres. Housing planned: 336 families in apartments; 1622 single workers in dormitories.

(Project discontinued. For further information see tables, Chap. IX.)

It was desired that temporary housing should avail itself, so far as possible, of existing Government property, and preference was early expressed by those in authority for the undeveloped blocks acquired as part of the Union Station improvement some years ago. These are within walking distance of many Government offices. Utility mains and paving were provided in the streets, and the blocks were about at grade.

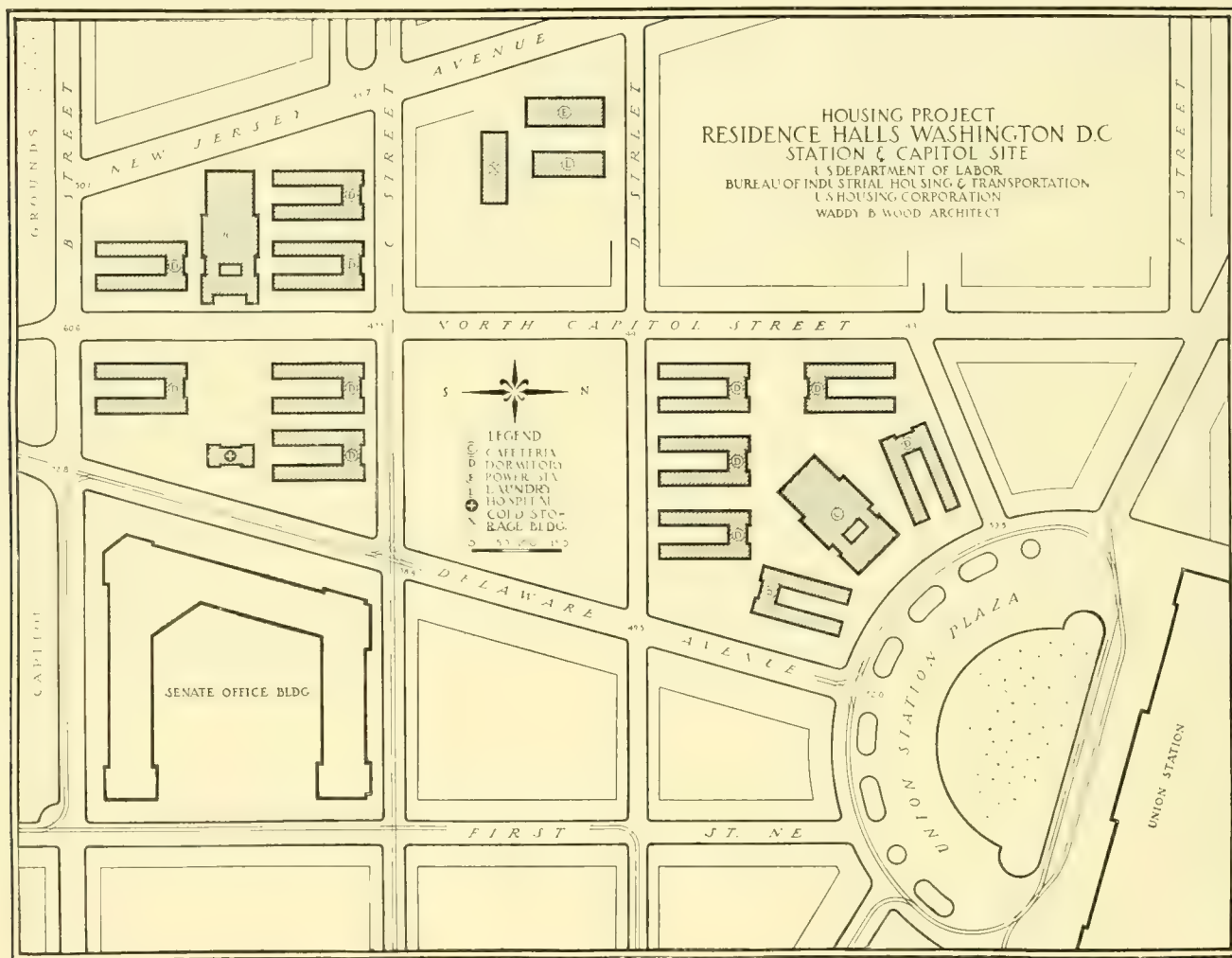
Several locations for a third group were considered. The Twenty-first and B Streets site was

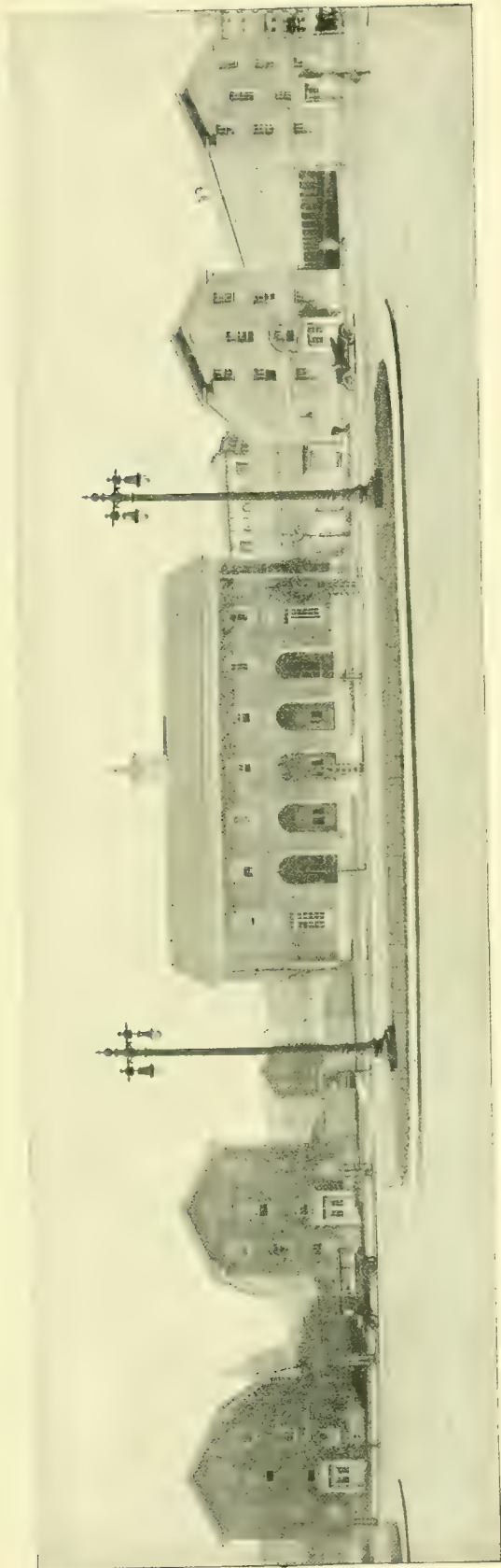
finally chosen in preference to one between the White House and the Washington Monument because it is convenient to the many permanent and temporary Government offices in the vicinity of the White House, because of its location on higher ground, its shape for the purpose, and the presence of utility mains. This site is north of the new Lincoln Memorial on private property which has been but little built upon.

The groups between the Capitol and the Union Station were almost completed at the time of the armistice, and have since been occupied. The group at Twenty-first and B Streets was not so far advanced, and was abandoned.

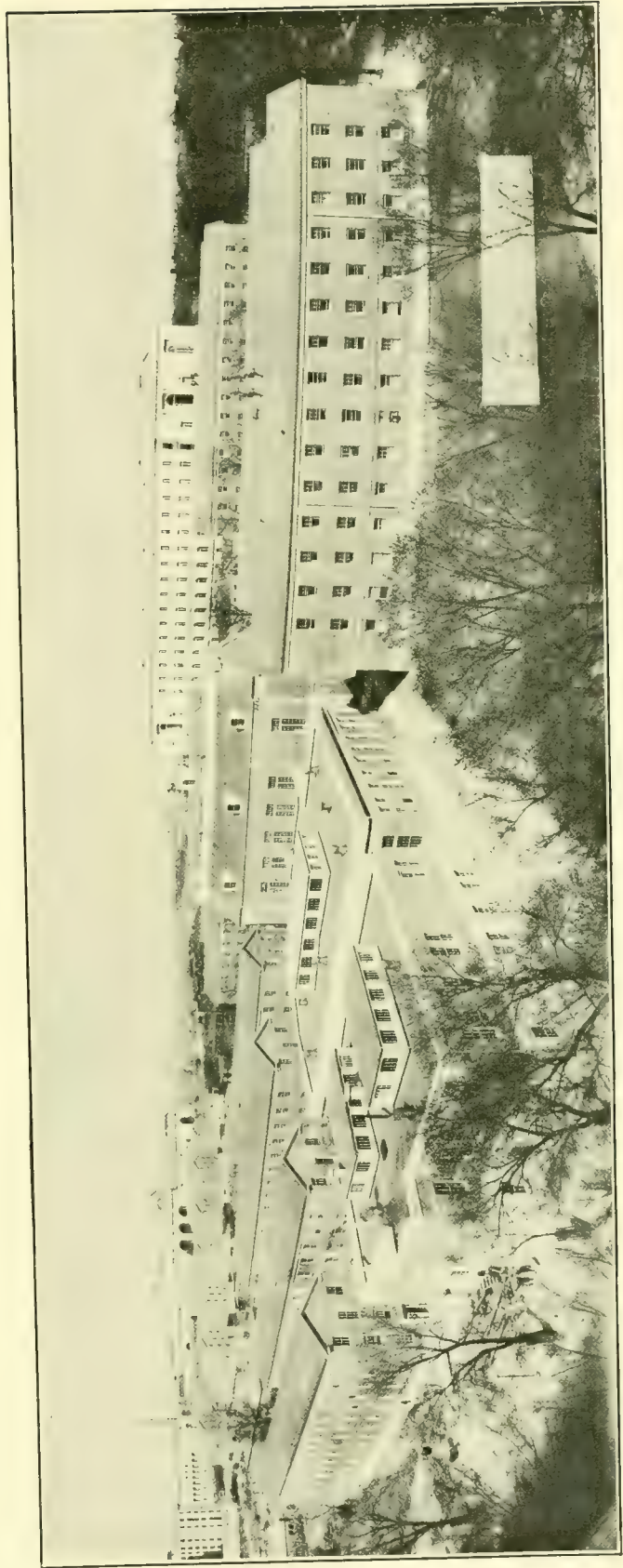
THE CAPITOL AND UNION STATION SITES.

The Capitol tract buildings occupy two blocks on each side of North Capitol Street with the main entrances leading from two straight walks across the blocks. The plan for the Union Station site buildings fits the existing block layout. Each group houses 972 persons, with common rooms, cafeteria,





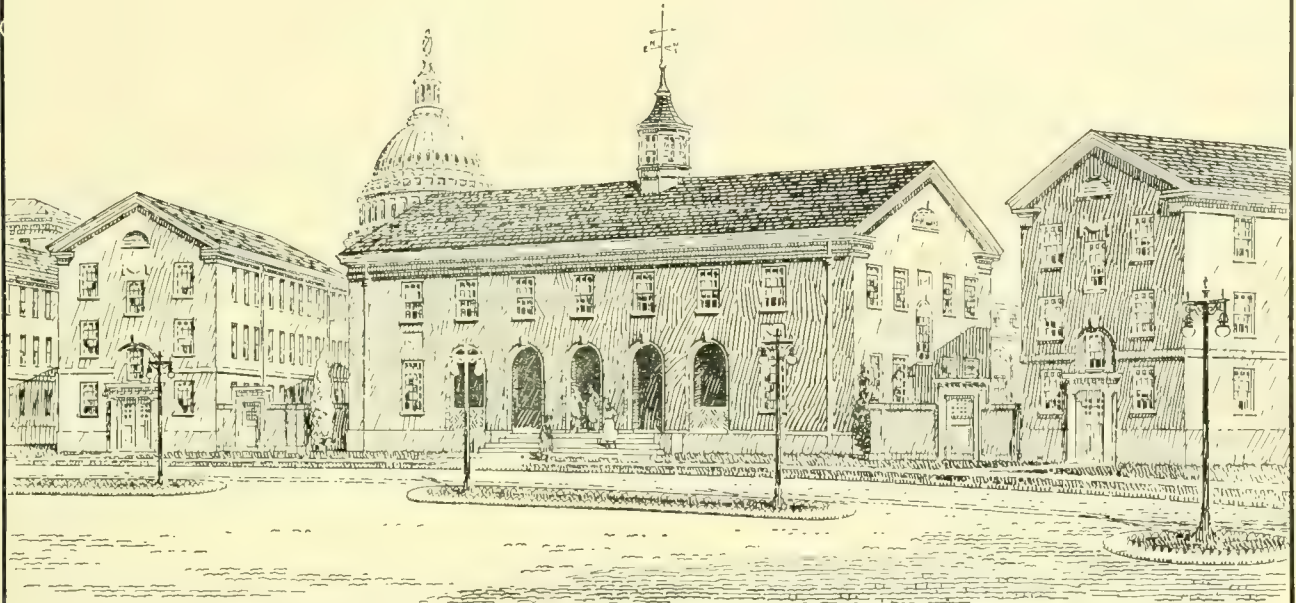
WASHINGTON RESIDENCE HALLS.



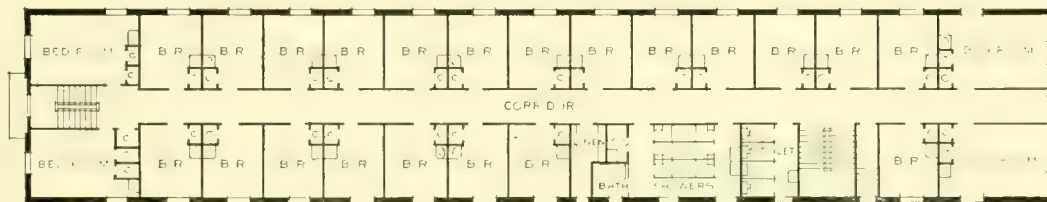
GENERAL VIEW OF WASHINGTON RESIDENCE HALLS.



DINING ROOM WASHINGTON RESIDENCE HALLS.

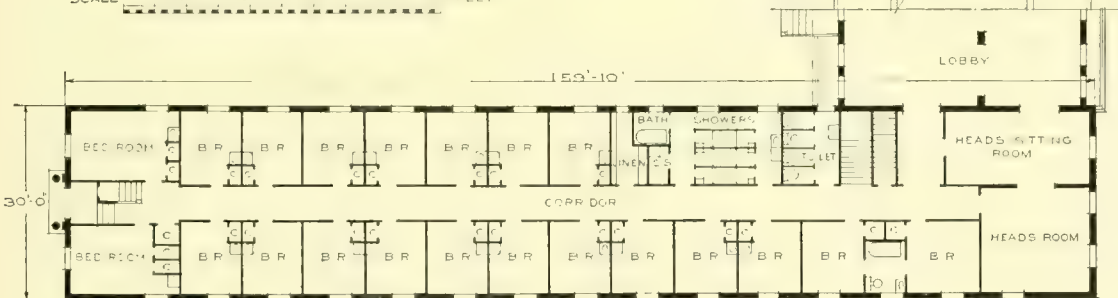


ADMINISTRATION BUILDING AND DORMITORIES



SECOND FLOOR PLAN

SCALE 1" = 10' 0" 4" 5" FEET



FIRST FLOOR PLAN

TYPICAL PLAN OF DORMITORIES

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT WASHINGTON D C

ARCHITECT WADDY B WOOD

and clubhouse for each group, but a single heating plant and power station, laundry, and infirmary for both groups. While compact, the arrangement is not unduly congested, considering its temporary nature.

The quality of the plan design of these two groups is best proven by those living in the buildings and by those running them, who pronounce them extremely comfortable and agreeable places of residence. Accommodation in the buildings was sought even before they were completed and there has been no vacancy since.

The individual plans show the extreme simplicity of the layout. There is in each wing a series of bedrooms either side of a corridor, each room containing a good-sized closet and a washbasin, and each floor containing the requisite number of toilets and shower baths, conveniently placed, to accommodate comfortably all the occupants of the floor.

The individual rooms are each fitted up with simple furniture specially made for these buildings, and rugs, curtains, and clothes boxes, also electric wall plugs for desk lamps. All the walls are prettily papered.

Besides bedrooms there are sitting rooms for each floor in which small groups of the girls may gather for recreation, without disturbing those in the bedrooms. There is a central office on the ground floor of each pair of dormitories. Then there are such conveniences for the residents as places for washing and ironing and for trunk storage. And there are yet other common rooms central to the several groups of dormitories. These are large enough for dancing and other community pleasures.

The dining halls complete the conveniences, these being large enough to accommodate without crowding all those who live in the dormitories.

There is also a small infirmary building for observation and emergency cases.

The construction of the buildings is excellent for their purposes, the outside walls being of terracotta blocks stuccoed, the roofs being covered with sheet asphalt while the floor construction is of wood. Being nonfireproof, the buildings are provided with fire exits and are protected by an adequate water system.

The buildings are simple but dignified in design and it is hoped that the cheap and quick-growing planting of trees, shrubs, and vines provided will materially enhance their appearance during their life. The buildings stand, however, on land ac-

quired by the Government to be used in the general dignified development of the Capitol, of which the Union Station Plaza is a part. The present dormitories are not in any way adequate to stand where they are in such a scheme. They were built for an emergency, and when that emergency is passed they should be removed.

TWENTY-FIRST AND B STREETS SITE.

The Twenty-first and B Streets site was created by the elimination of upper Water Street between Twenty-first and Twenty-third Streets NW. and of Twenty-second Street from upper Water Street to C Street NW. plus the south half of C Street from Twenty-first to Twenty-third Street, and utilizing part of Potomac Park north of B Street extended. Under the proposed arrangement a service drive crosses from Twenty-first to Twenty-third Street back of the cafeteria with a branch to C Street and there are four north and south crosswalks with a drive entrance to the administration building. There was to be an infirmary on the public triangle where C Street meets New York Avenue. It was planned to provide a very intensive development of temporary apartment buildings and dormitories spaced with very long wings but 30 feet apart and wooden fences connecting them along the street.

Bureau of Standards (Project No. 54f).

Area planned: 9.03 acres. Housing planned: Apartment houses, 102 families. Dormitories, 166 single persons.

(Project discontinued. For further information see tables, Chap. IX.)

In the proposed housing for the Bureau of Standards one peculiarity was the large proportion of very small families, many of the employees being young married men with not more than one child. One reason for this is that the salaries are so low that many of the scientific men leave after a few years. The Bureau of Standards is located $3\frac{1}{2}$ miles northwest of the White House on a hill near Connecticut Avenue, the principal artery of this district, and is in a region very much cut up by deep ravines. Land values have increased here to a very high point, so that the difficulties of finding a suitable piece of property were unusual. Immediately in front of the bureau along Connecticut Avenue an otherwise satisfactory site was found to be so underlaid with rock as to make economical development impossible, especially when the very

high land value was also considered. West of the bureau, however, a reasonably level tract was found, the corner of which was but 150 feet from the corner of the bureau's property. It necessitated running both sewer and water for more than a block each through undeveloped property, but this was more than counterbalanced by the relatively reasonable figure for the land and possible economy in construction.

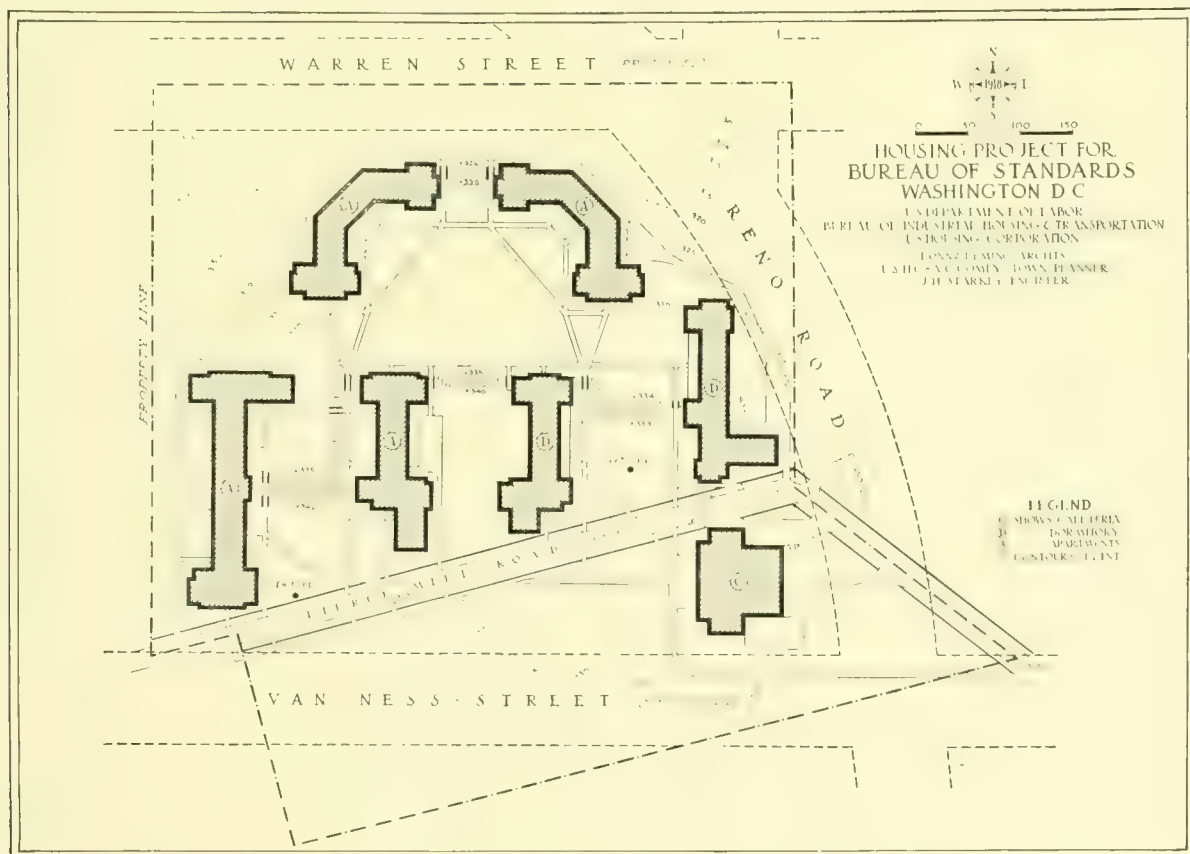
The plan is complicated by the fact that the present street, Pierce Mill Road, is not planned as one of the streets ultimately to be developed when this district is built up. Van Ness Street is now laid out on paper to extend diagonally through the south part of the tract and had to be considered of more ultimate importance in the plan. Other streets have also been shown on the official street plan adopted by the District of Columbia, including an important future thoroughfare, Reno Road, cutting through the eastern part of the tract, and Warren Street bounding it on the north. These roads, however, are laid out at considerably lower grade than the relatively flat central portion of the tract. It was, therefore, decided not to attempt to use them as means of access. Pierce Mill Road is left as the only present approach road. From it

a broad path around the backs of the buildings was planned to provide for the occasional service needed. The plan provides three courts, flanked by dormitories and apartment buildings, leading through to a lower roughly semicircular court with two other apartment buildings. Two very large trees occur on the tract, one a magnificent tulip tree of 66 inches diameter, which was made the dominant feature of the eastern court, the other anequally fine tupelo dominating the western court.

When Van Ness Street is constructed, Pierce Mill Road will undoubtedly be eliminated, and it is possible that the rather informal group of apartments and dormitories might then be extended across it.

At the southeast corner nearest the bureau a large cafeteria was located, readily reached from all parts of the project by direct paths, but at the same time near enough to the bureau for people coming to lunch. A power and heating plant was located under the cafeteria.

All the buildings were intended to be of permanent brick construction. The dormitories were to have common rooms. No other community features were provided by the plan.



South Capitol Street Site (Project No. 54g).

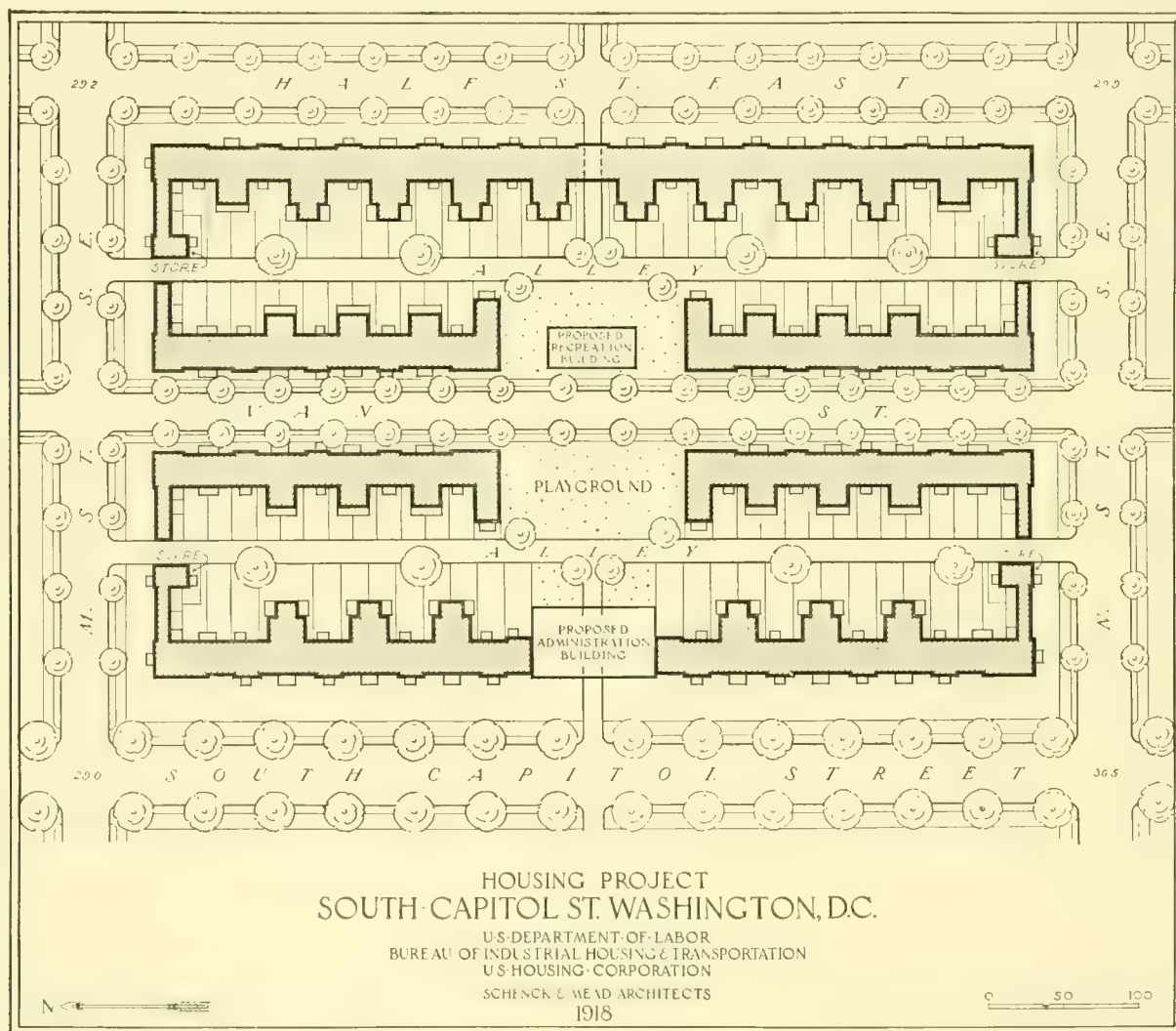
Area planned: 7.09 acres. Housing planned: Row houses, 52 families; apartment houses, 149 families; total, 201 families.

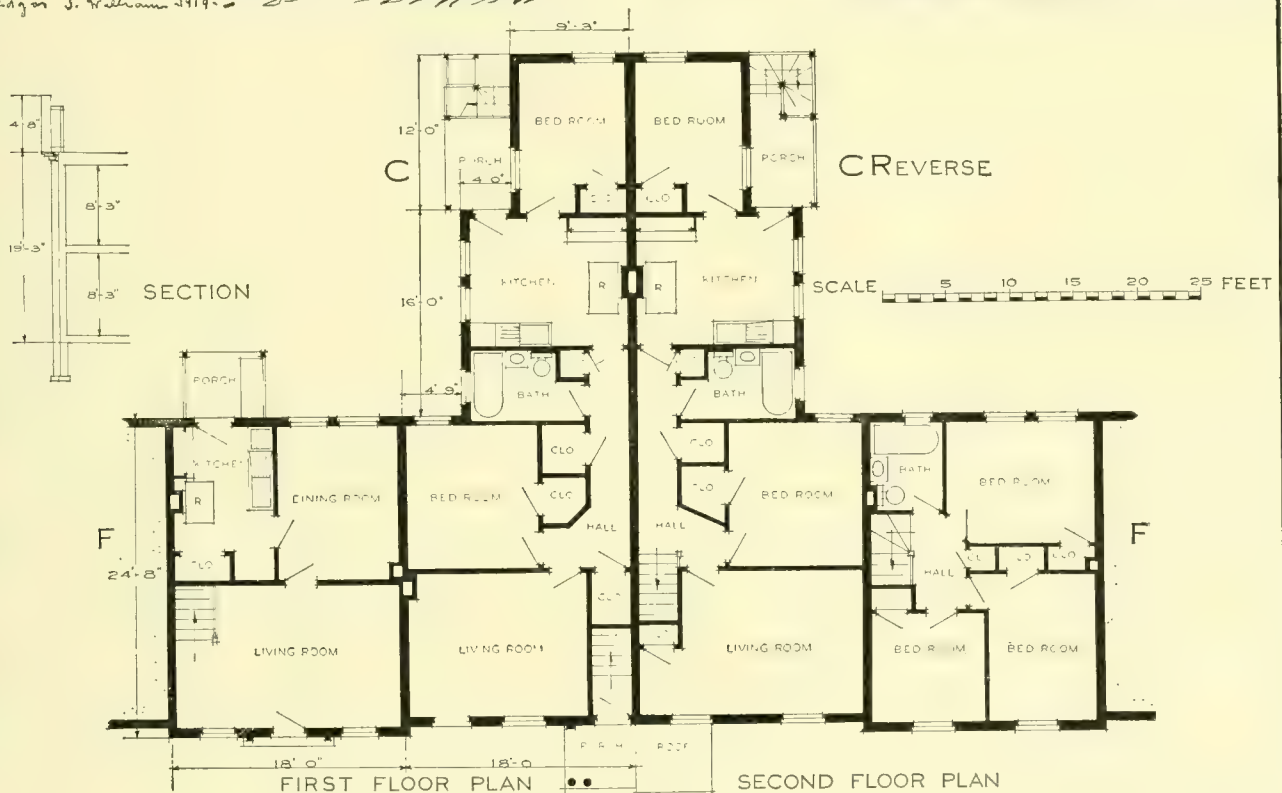
(Project discontinued. For further information see tables, Chap. IX.)

Another site, for the present accommodation of civilian war workers with families, was chosen east of South Capitol Street between N and M Streets. It was also to serve another purpose. The Ellen Wilson Homes Co., formed before the war, was contemplating the provision of proper housing for those about to be dispossessed by the alley dwellings law. The operation of this law was deferred during the war, so that it seemed particularly opportune that dwellings should be built to be ultimately suitable for housing the dispossessed tenants, but during the war to be occupied by Government war workers. The site selected was a large block intersected by a minor street, about five blocks from the car line on Four-and-a-half Street SW. The dis-

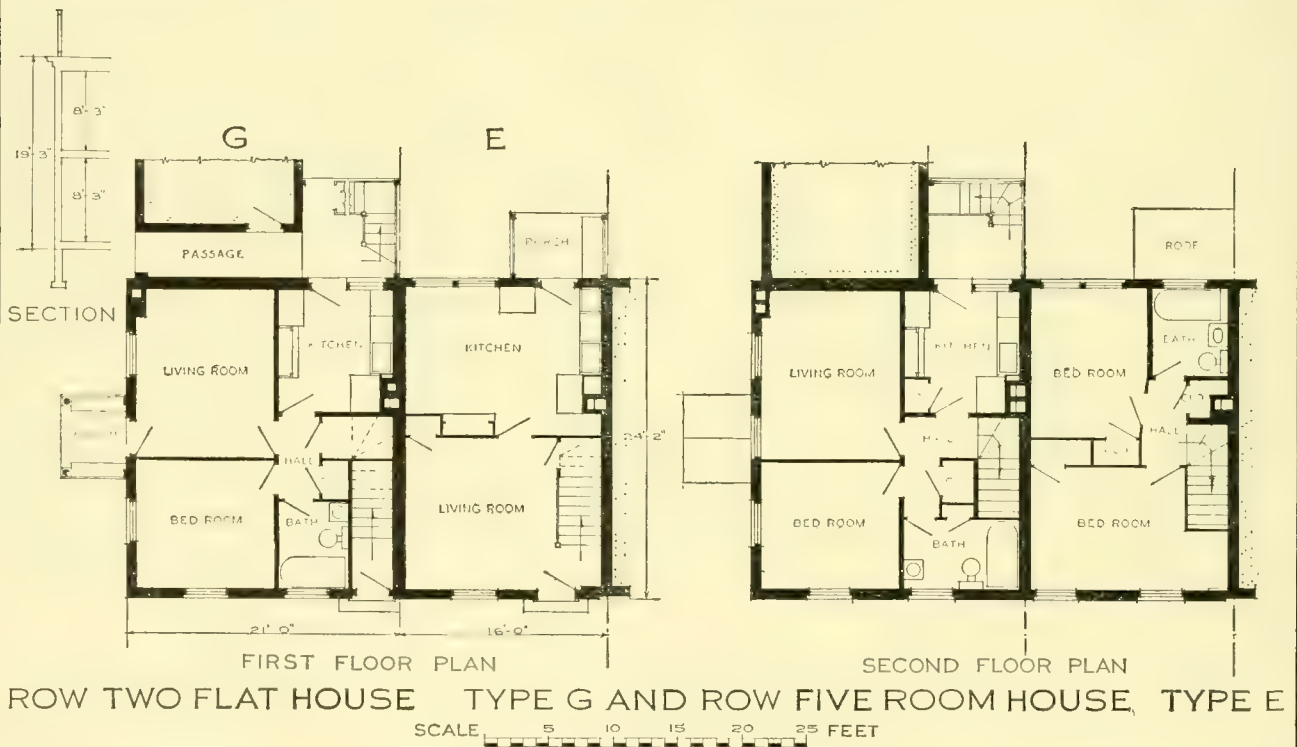
trict north of this property, while not particularly attractive, is not such as to deter temporary home seekers from coming to it. On the south there is a fairly solidly built area of Negro homes. As most of the alley dwellers are Negroes it was desirable that these houses should be not far from the present Negro district. The plan contemplated a very dense development of one family and two-family (two-flat) houses in rows, relieved by two small reservations connecting with each other across the center of the tract and reached by archways from the principal streets. On one of these reservations a small recreation building was to be built. Back yards provided are very small but sufficient for drying space in every case. The plan fits into the established plan of the city of Washington, which absolutely controls its main features. There are four stores at the end of Van Street.

The units are very small, generally three or four rooms. There are about 8 per cent each of two,

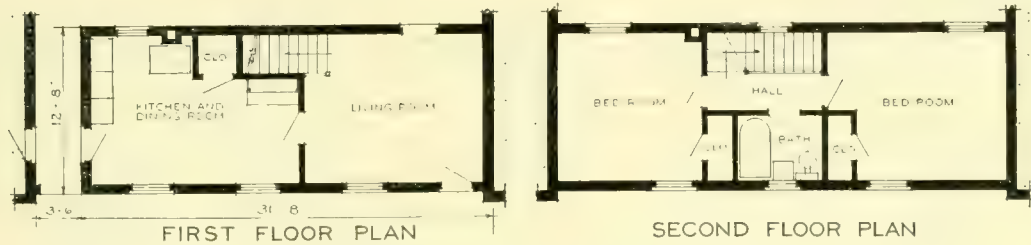
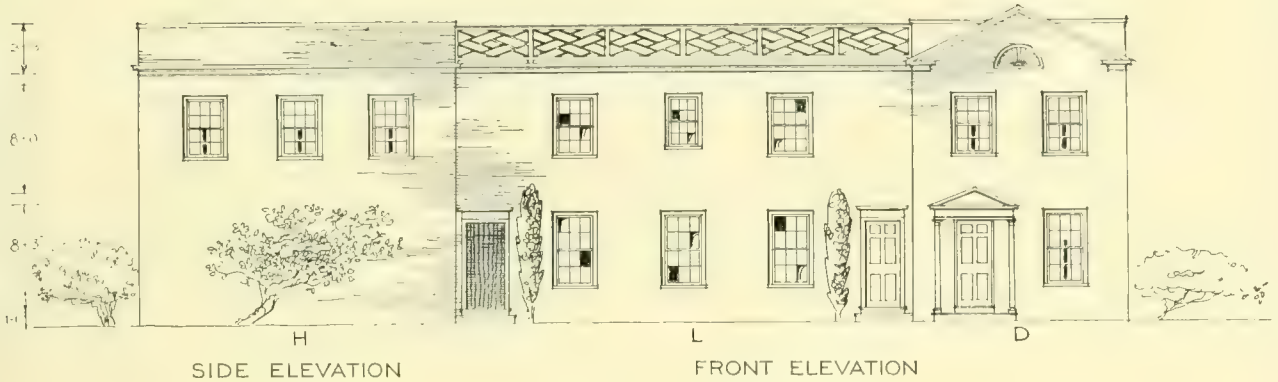




ROW TWO FLAT HOUSES TYPES C AND CR WITH
 SIX ROOM HOUSE TYPE F
 UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT WASHINGTON D C
 SOUTH CAPITOL STREET
 ARCHITECTS SCHENCK AND MEAD

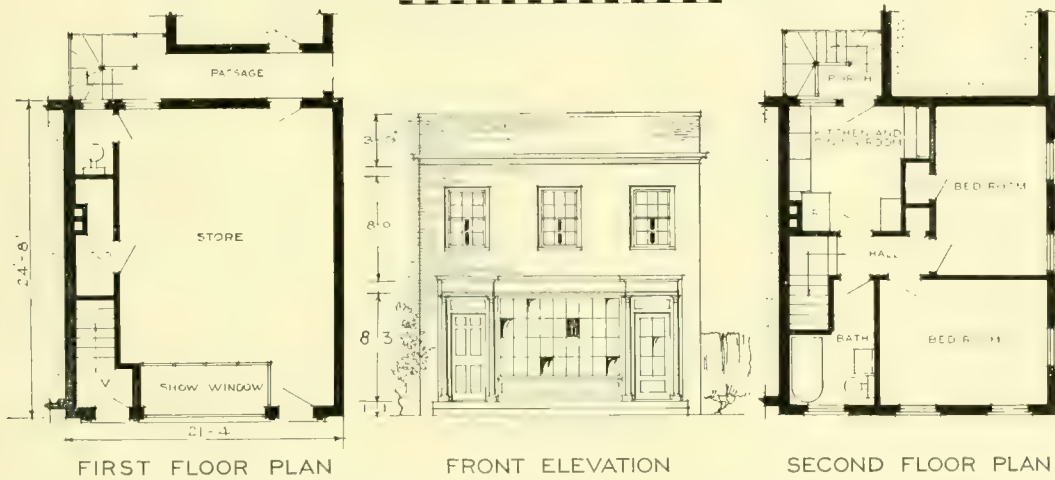


UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT WASHINGTON, D. C.
 SOUTH CAPITOL STREET
 ARCHITECTS SCHENCK AND MEAD



FOUR ROOM ROW HOUSE TYPE L

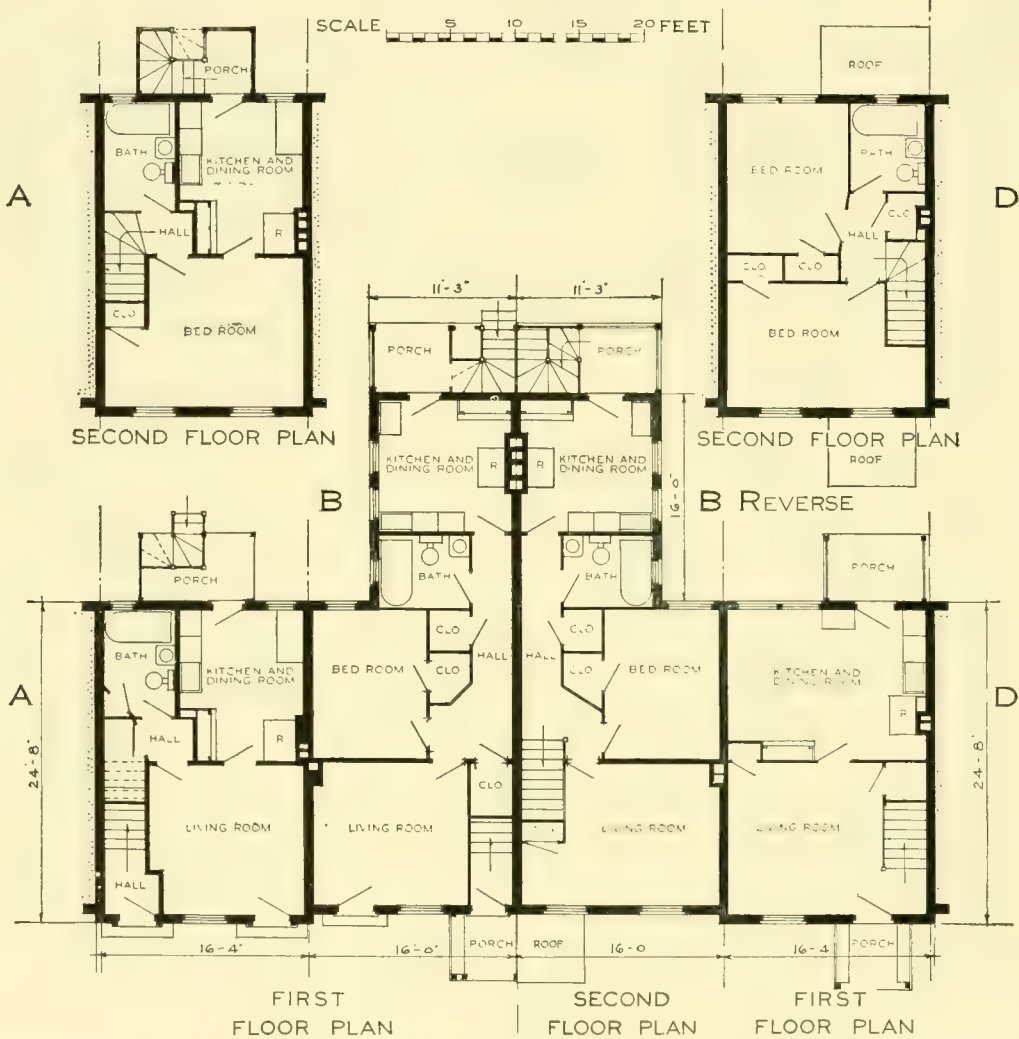
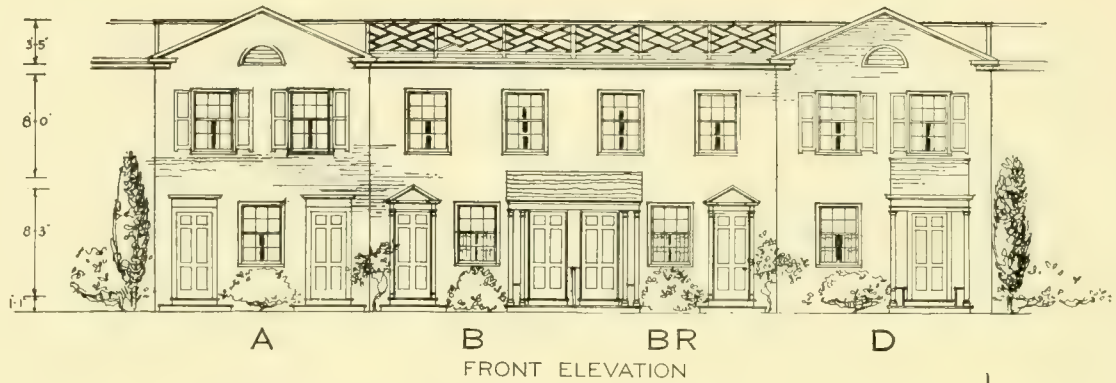
SCALE 5 10 15 20 25 FEET



CORNER STORE AND APARTMENT TYPE H

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT WASHINGTON D C
 SOUTH CAPITOL STREET
 ARCHITECTS SCHENCK AND MEAD



ROW TWO FLAT HOUSES TYPES A-B-BR-D
UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT WASHINGTON D C
SOUTH CAPITOL STREET

ARCHITECTS SCHENCK AND MEAD

five, and six-room dwellings. They have proper sanitary arrangements and are in every way calculated to avoid the bad living conditions that exist in the present alley dwellings. The plan (p. 356) shows the arrangement of houses two rooms deep alternating with two-flat houses three and even four rooms deep to avoid the dark middle rooms of the usual deep plan. The facades are exceptionally well designed and show a pleasant variety in elevation gained by the change in roof balustrade, porches, and doorways.

Washington Navy Yard (Projects No. 27a, apartments, 27b, houses, 27c, dormitories).

Area planned: For apartment houses, 14.33 acres; for row houses, 22.73 acres; for dormitories, 18.84 acres; total, 55.90 acres.

Housing planned: Apartment houses, 308 families; row houses, 274 families; dormitories, 540 persons.

Housing constructed: Dormitories, 540 persons.

(Projects 27a and 27b discontinued. For further information see tables, Chap. IX.)

A site for the navy-yard workers was selected in the southeast part of Washington about a mile and a quarter from the navy yard, between Potomac Avenue and East Capitol Street and between Seventeenth and Nineteenth Streets SE., because though cheaper land was available both immediately west of the yard and across the Anacostia River less than a mile away, these sections were not as attractive to the employees. The site comprised 10 city blocks as already laid out in the official plan of Washington and had not been built upon except for a few small houses near the northwest corner, of which only three are really of value. Most of the streets had been graded to the established grade of the city, and B Street already had a macadam pavement and walks. The built-up section of the city came at all points to within a block or so of the western edge of the development along Seventeenth Street. There is a car line at Fifteenth and East Capitol Streets, two blocks from the corner of the property, which can at any time readily be extended along East Capitol Street.

The reluctance of the two city railway companies to make the concessions recommended in February in a report of the Transportation Division of the Housing Corporation long delayed the relief for the navy-yard workers. The leading feature of this report was that it required no outlay of money to remedy the situation on the eastern side of the city. The effective remedy lay solely in permitting passengers of East Washington lines of the

Washington Railway & Electric Co. east of Eighth Street to transfer to and from the Eighth Street line of the Capital Traction Co. leading to the navy yard. Finally on November 14, 1918, at a hearing before the public utilities commission, an agreement was reached by which the Washington Railway & Electric Co. and the Capital Traction Co. undertook to give reciprocal transfers at three points requested by this corporation. The commission fully granted all that was asked by the United States Housing Corporation, and the navy-yard employees were brought to within two blocks of the housing site for the payment of one fare.

On the north side of East Capitol Street opposite the housing site the city is planning to erect a large high school on a tract four city blocks in extent which it has acquired for the purpose. From B Street south the property is flanked on the east by reservation 13, property of the District of Columbia, eventually to accommodate a large hospital group. The street plan was thus substantially fixed. It provided two small triangular parks at Massachusetts Avenue and Seventeenth Street; and Potomac Avenue and Seventeenth Street, respectively, and a very large proportion in streets throughout, as all the streets are 80 feet or more in width and the avenues 160 feet. It should be remembered, however, that this is to the building line and that front yards are included according to the Washington custom. One new street was planned by the Housing Corporation to be cut through between B and C Streets as this block had originally been laid out much too wide for the type of development contemplated.

It was decided at the outset to confine the temporary dormitories or barracks for navy-yard employees to two blocks at the south end of the tract and nearest to the navy yard. Two more blocks adjoining these were not needed for the initial development, and therefore were planned as recreation areas. On a small triangular block near these it was proposed that there should be a recreation building. Subsequent plans for the extension of the navy-yard project, which were in hand at the time of the armistice, contemplated reducing the area of the ball field by one row of lots along Seventeenth Street. The rest of this extension would have spread the initial tract into the adjoining blocks to the west, and over vacant areas to the north and east as far as a proposed

monumental circle and entrance to the new Anacostia River Park on the axis of East Capitol Street. This addition would have more than doubled the number of permanent dwellings in the project.

The plans as completed contemplated dividing the northern part of the initial tract into three apartment blocks and five blocks for houses, apartments being concentrated along East Capitol Street and Massachusetts Avenue. They were so disposed upon each of the blocks as to leave a playground in the rear with an alley on all sides of it and space for garages. Along the sides of the block a very excellent type of apartment house, only two rooms deep, was used. In the two apartment buildings on Seventeenth Street provision was made for 16 stores. The larger buildings along East Capitol Street were designed with courts open to the south, narrower than the standards adopted by the corporation. In this case, however, it was felt that the desirability of concentrating the maximum number of families and economizing in expense owing to the saving of halls and stairs possible with such a plan more than counterbalanced the advantages of the more open types of buildings.

The blocks used for houses were over 300 feet deep, which, had there been no lots on side streets or "key" lots, would have provided an unnecessarily large number of very deep lots. Therefore, the blocks were laid out with rows on all four sides and a unique alley system running diagonally toward the centers of the blocks, where a space was reserved for garages. This arrangement avoided the right-angle turns usually introduced where there is a row of houses across the center of the block ends, and at the same time made the alleys more visible from the street, open metal fences being contemplated.

As this project would become an integral portion of the city of Washington, no other community features than those mentioned were provided.

This housing being designed for permanent occupancy of the better paid employees it formed, with stores and the houses which were to be erected adjoining, a high-class community in the neighborhood of the yard. The comparatively low land values made possible the open development of apartment houses indicated in the plan, the arrangement allowing ample playground inside each block and giving an agreeable outlook from the

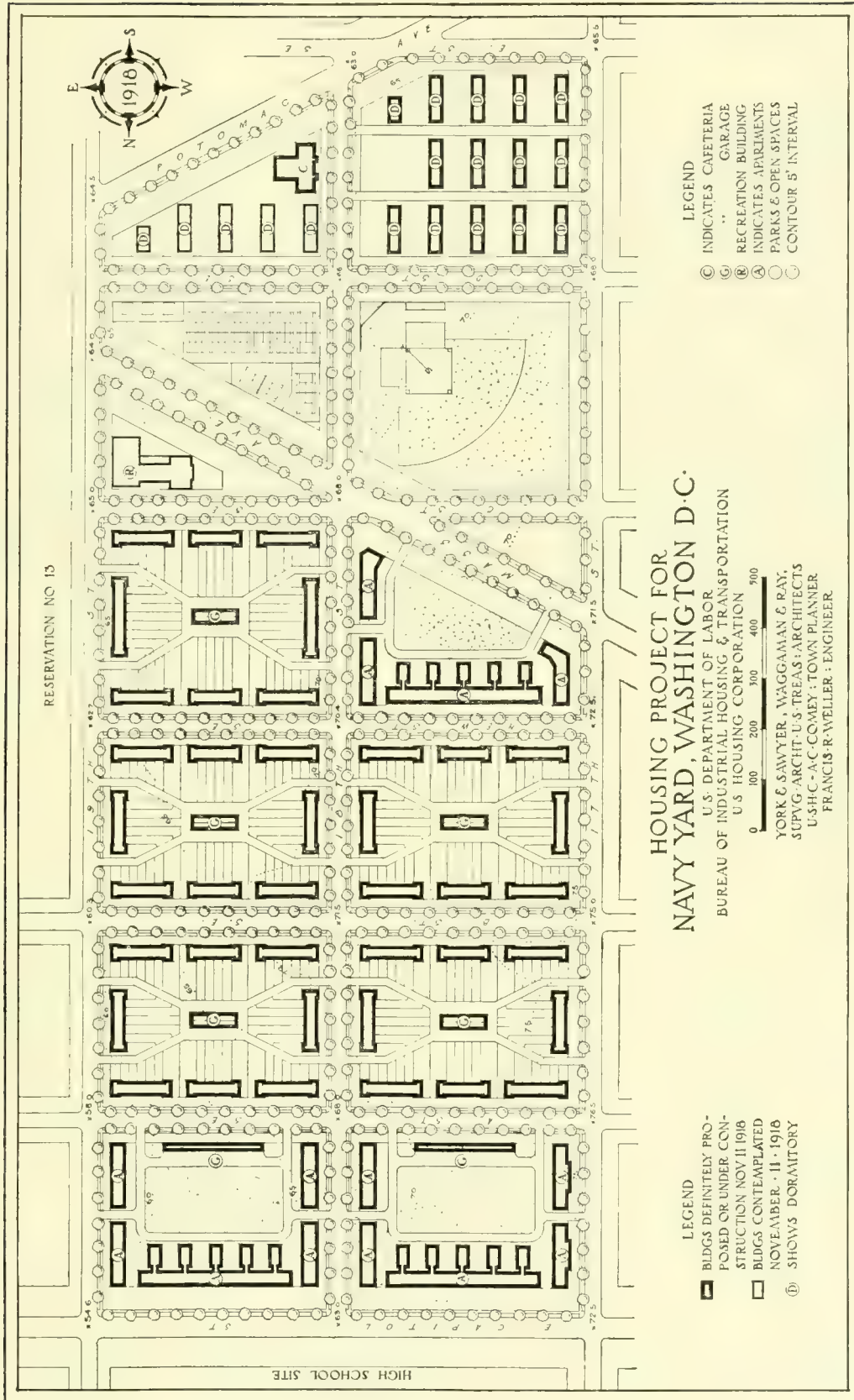
rather generous porches provided with each apartment. The apartments are well planned and rather more generously than usual in the practice of the corporation. The grouping is excellent as is the simple treatment of the exterior design.

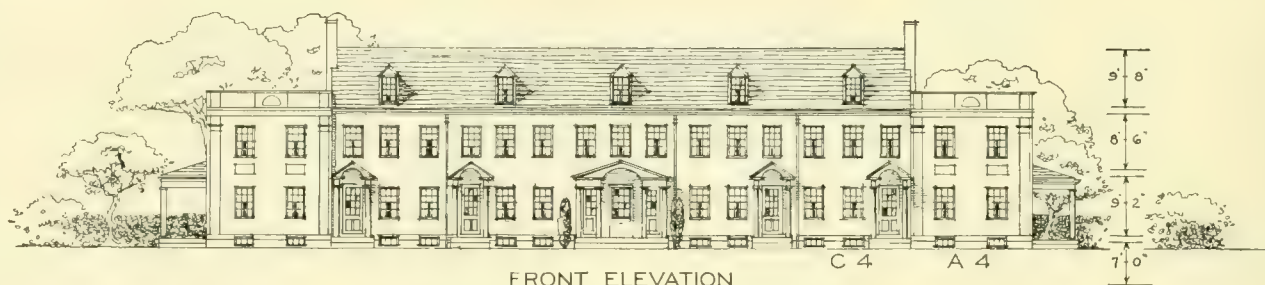
As shown, the plan has the fault of using an identical disposition of building masses on successive streets of the rectangular plan, so as to leave continuous narrow openings extending in direct line of sight across several blocks. This fault could have been corrected by changing the relative positions of the long and the short rows on some of the streets.

The Commissioners of the District of Columbia had no funds available for the water and sewer extensions and pavements needed for the housing development, but offered to have their engineering department prepare plans, specifications, and estimates for these utilities on this and most of the other Washington projects. The engineers of the various departments cooperated readily in preparing these promptly when furnished plans showing the requirements on each project.

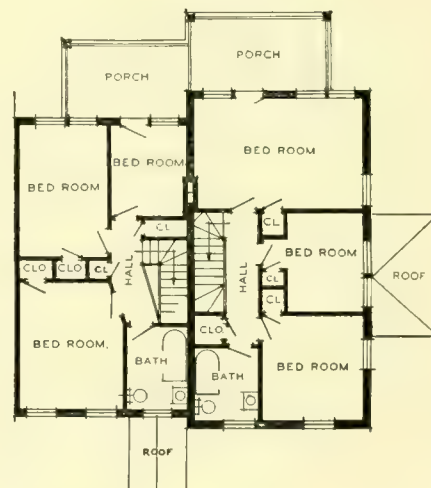
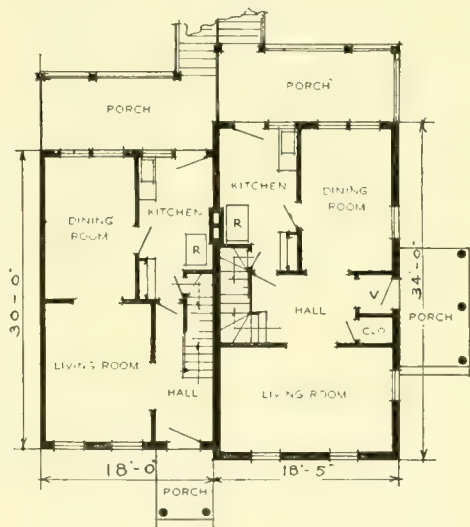
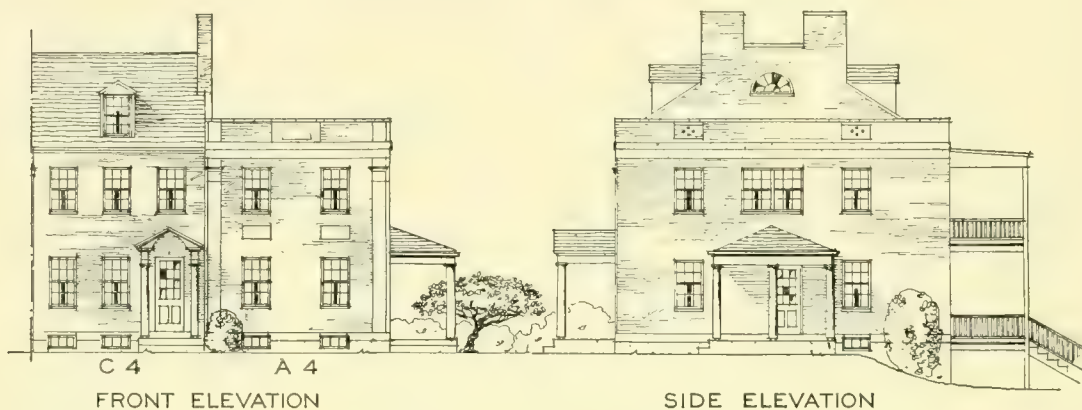
The Engineer Commissioner desired that these works be constructed by the District departments. It was arranged that the Housing Corporation should deposit with the District of Columbia collector of taxes the estimated amounts necessary for the construction of pavements, sidewalks, sewers and water mains, as a fund to be used by the District of Columbia departments as a working capital for the installation of these utilities. Any unexpended balance was to be returned to the corporation. As soon as appropriations for these utilities could be secured, by act of Congress or other usual procedure, the adjacent property was to be assessed according to the existing laws and the portion of cost usually borne by the District of Columbia returned to the Housing Corporation.

To provide facilities for bringing construction material to the site, permits were obtained from the District Commissioners to construct about 4,800 feet of standard gauge railroad, mostly over public reservations and through public streets from an existing siding of the Pennsylvania Railroad south of Pennsylvania Avenue through Seventeenth and Eighteenth Streets to East Capitol Street. Surveys were made and contract for construction let about the middle of September. The cost of this railroad was approximately \$20,000.





SCALE 10 20 30 40 50 FEET



SIX ROOM ROW HOUSES

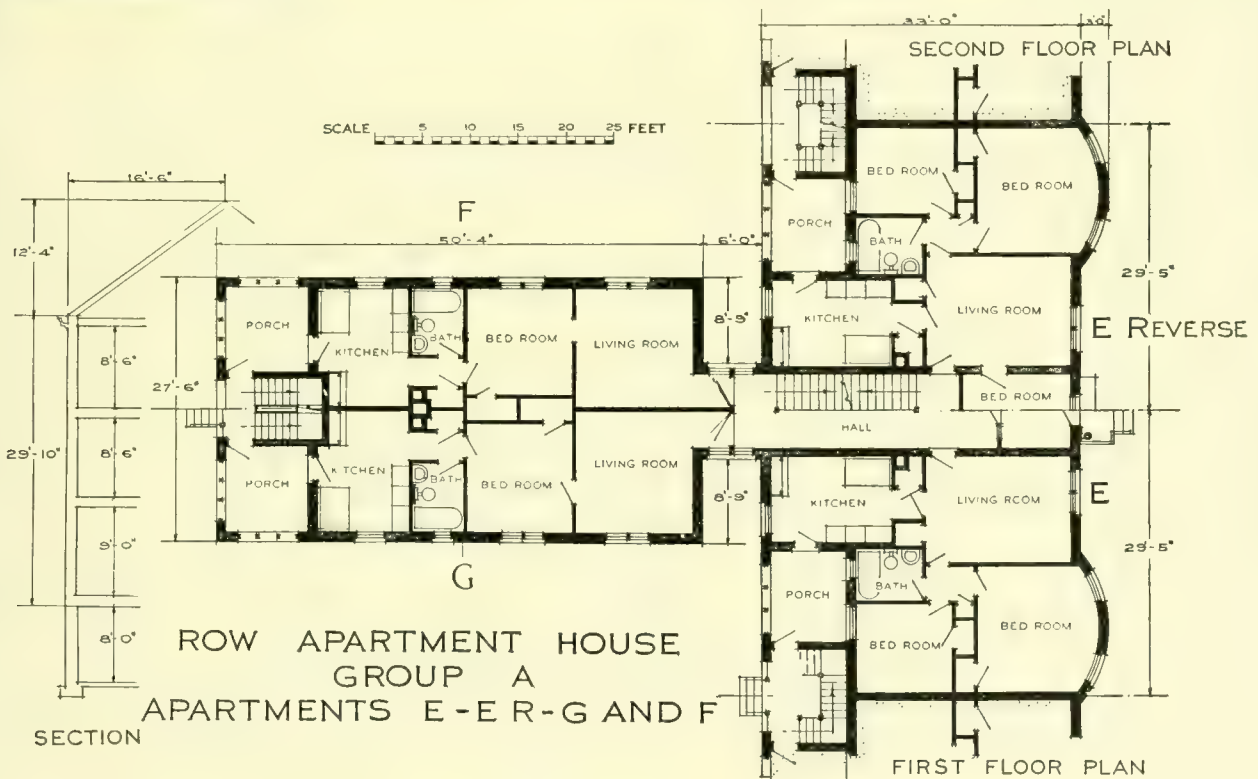
GROUP T TYPES C 4 AND A 4

SCALE 5 10 15 20 25 FEET

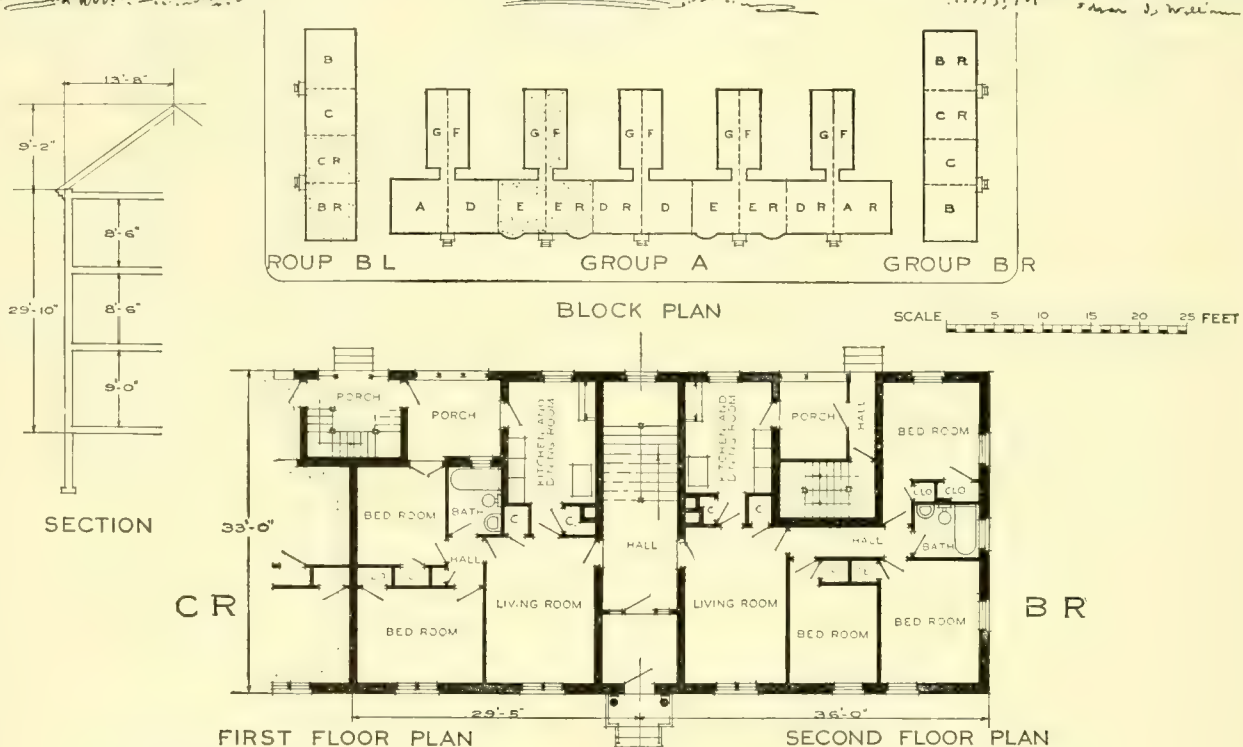
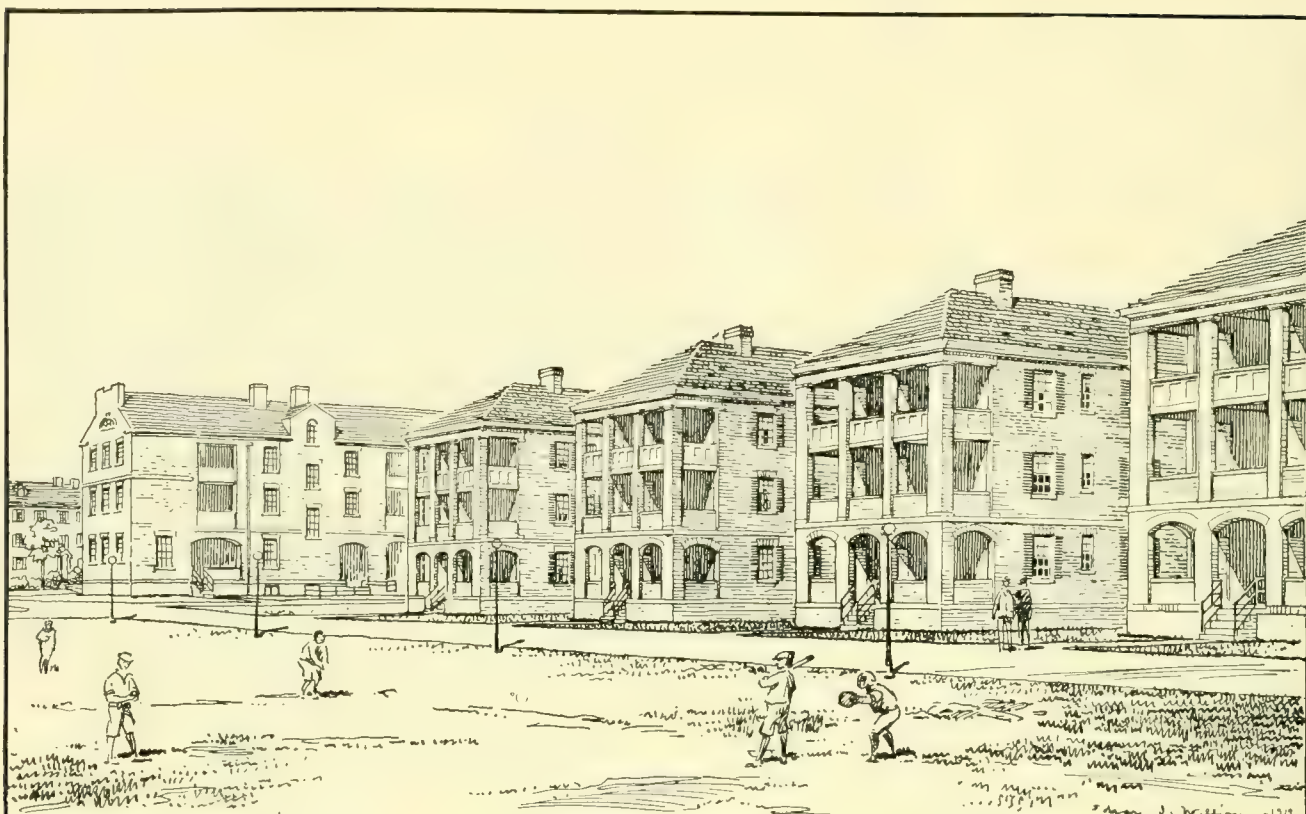
UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT WASHINGTON D C
NAVY YARD

ARCHITECTS

WAGGAMAN AND RAY



UNITED STATES HOUSING CORPORATION
PROPOSED DEVELOPMENT AT WASHINGTON D C
NAVY YARD APARTMENTS
ARCHITECTS YORK AND SAWYER



ROW APARTMENT HOUSES GROUP B L APARTMENTS C R - B R

UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT WASHINGTON D C
 NAVY YARD APARTMENTS

ARCHITECTS YORK AND SAWYER

Washington Steel & Ordnance Co. Site (Project No. 549).

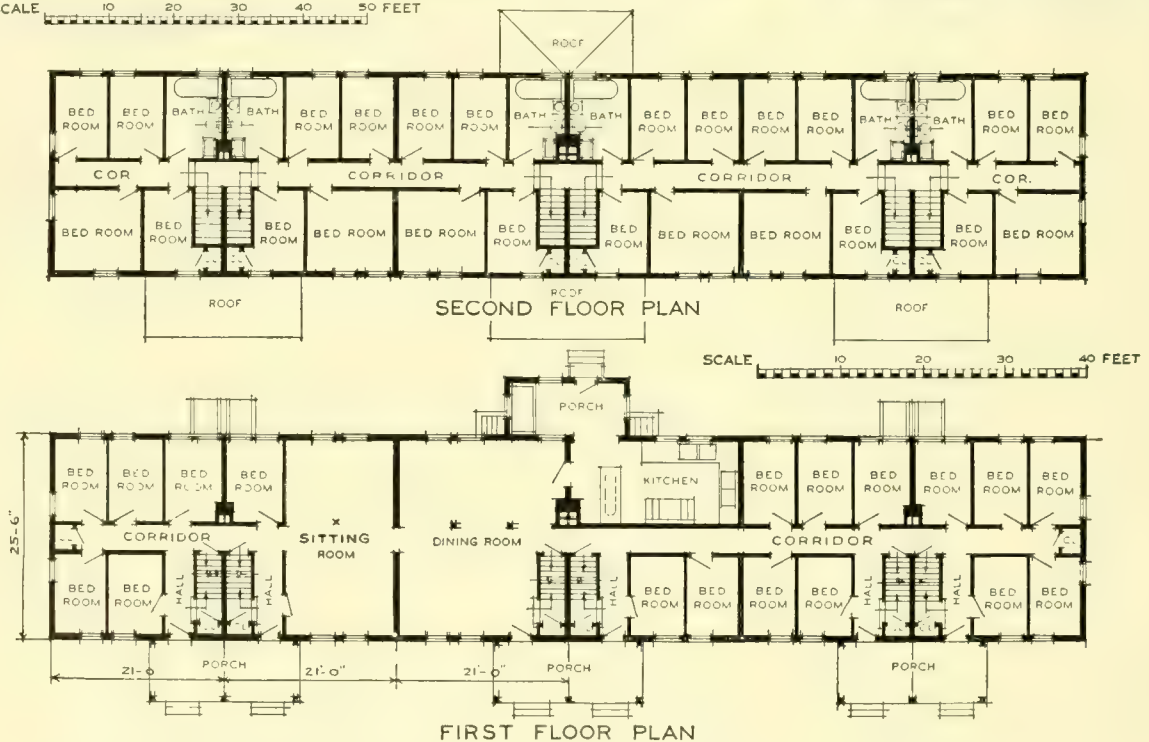
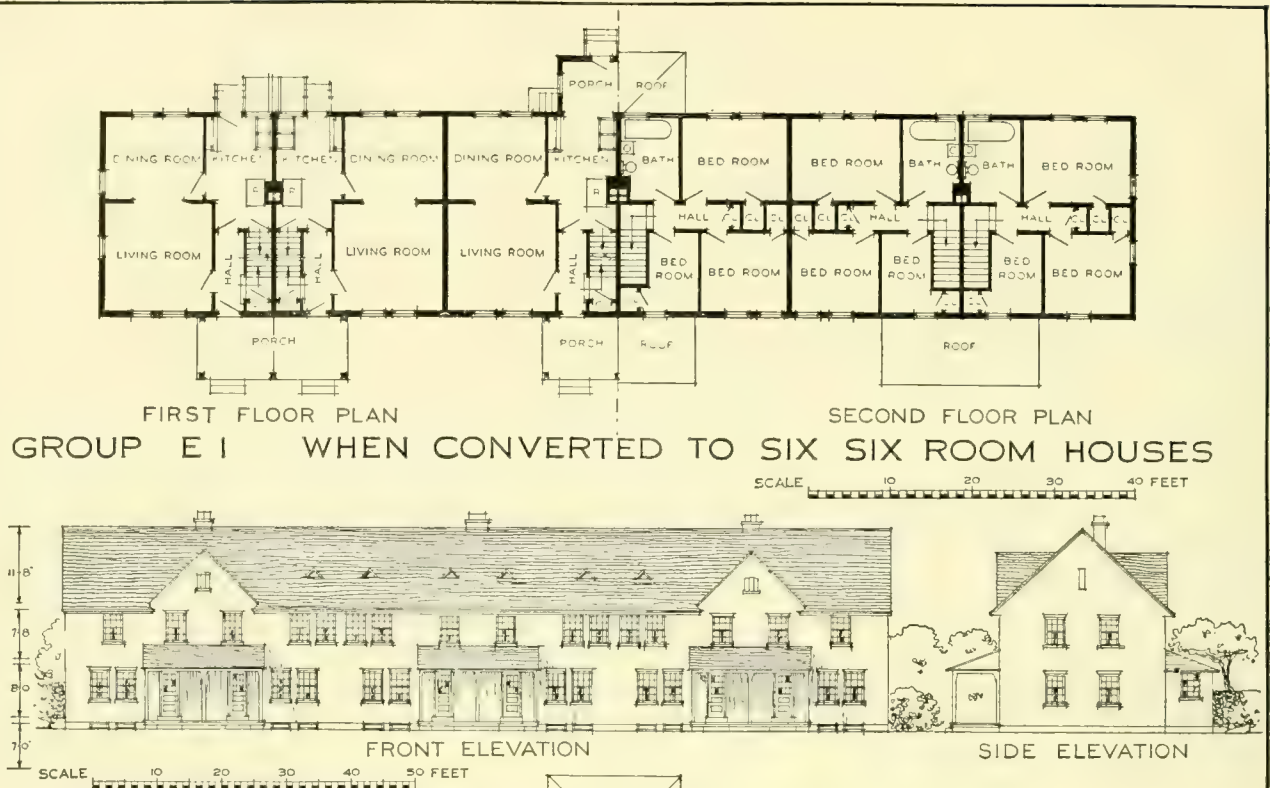
Area planned: 10.50 acres. Housing planned: Detached houses 12 families; semidetached houses, 38 families; total, 50 families. Convertible dormitories, 164 single workers.

(Project discontinued. For further information see tables, Chap. IX.)

In addition to Government clerks and navy-yard workers, it was found necessary to provide a small amount of housing for Washington's only

large industrial plant, the Steel & Ordnance Co. on Portland Street, south of Anacostia River. A favorable tract of 10 acres was laid out for 50 detached and semidetached houses and 4 dormitories convertible into 6 row houses each. As the previously adopted city street system provided very large blocks, interior spaces were reserved for playgrounds or gardens.





FORTY FIVE ROOM BOARDING HOUSE GROUP E I
 CONVERTIBLE TO SIX SIX ROOM HOUSES

UNITED STATES HOUSING CORPORATION
 PROPOSED DEVELOPMENT AT WASHINGTON D C
 PORTLAND STREET

ARCHITECTS MILBURN HEISTER & CO

WATERBURY, CONN. (PROJECT NO. 380).

CHASE SITE.—Area planned: 11.32 acres. Housing planned: Detached houses, 47 families; semidetached houses, 22 families; over store, 1 family; total, 70 families. (Project discontinued.)

SYLVAN AVENUE SITE.—Area planned: 18.11 acres. Housing planned: Detached houses, 68 families; semidetached houses, 66 families; over store, 1 family; total, 135 families. Housing constructed: Detached houses, 29 families; semidetached houses, 26 families; total, 55 families.

(For further information see tables, Chap. IX.)

Waterbury, Conn., is in the valley of the Naugatuck River. The city is built in a basin surrounded by high hills. On July 1, 1917, the population was about 87,000. On June 14, 1918, it was estimated at 115,000. The usual difficulties of high labor turnover were prevalent, and called for housing as one necessary remedy.

Several sites were considered in detail for use in our housing development. Owing to the insufficiency of the transportation system of Waterbury it seemed essential to have the housing within walking distance of the industries. This restricted the choice to land which was steep, rocky, and hard to develop economically.

Two sites were selected; the Chase site to serve the plants in the northern part of the city, and the Sylvan Avenue site to serve the plants of the central section, particularly the Scovill Manufacturing Co.

The Chase site was patriotically offered to the Government as a gift. Water, gas, and electricity were available, but a sewer had to be provided. The land was a bowldery sidehill of 15 per cent slope in considerable parts. For this reason our estimates of construction cost showed that this site was about as expensive per family as the other site, in spite of the saving in land cost. Complete plans were made for the development of the Chase site, and work was started, but abandoned after the armistice.

While rather steep and very bowldery the Sylvan Avenue site is less rocky and steep than much residential land in Waterbury and was the first choice among many housing sites considered. A prime advantage was that it was within walking distance of the Scovill Manufacturing Co.'s works and those of the American Brass Co. It faced on two established streets, Sylvan Avenue and Madison Street, the latter of which leads to the car line on Baldwin Street close by. A school, a fire station and utilities were near. A city park was within a few hundred feet.

Although largely dictated by existing streets and property lines, by the topography, and by adherence to the local standard of lots roughly approximating one hundred feet in depth, the street plan has certain interesting features. It gives good outlets both for traffic and drainage toward Baldwin Street. The vistas are all of a pleasant length for picturesque effect. The previously existing Madison Street has a curve of about 900 feet radius only 500 feet long connecting two long tangents; but partly owing to its curving profile, gradually increasing in steepness after reaching the first houses of the project until it dips out of sight by coming to a flatter gradient, and partly owing to the arrangement of the houses, the street seems rather to be one continuous curve. The abrupt reverse in curvature of Laval Street between North and South Places, while motivated by the topography, is too sudden to be pleasant in relation to the smooth easy curvature of the adjacent portion. The difficulty of getting houses to fall into an agreeable succession of compositions along such a line was increased in execution by surveyor's errors which turned several houses at a considerable and unintentional angle with the street line. It is at least questionable whether it would not have been better to make Laval Street straight from North Place to South Place with two distinct but very slight angles, and to introduce similar straights and angles in Lounsbury Street. Several of the streets have gradients as high as 9 per cent, unavoidable on any economic basis under the limitations of boundary and topography, and not seriously objectionable in such purely local streets except on the score of maintenance of road surface. Both roadways and walks are of gravel, the former to have an oiled surface. Gutters are of cobble stones with curbs around corners.

The normal lot width is 40 feet. The side spaces between detached houses normally vary from 20 to 25 feet and between semi-detached

houses 25 to 35 feet, but in both cases this space is frequently encroached upon by porches. No two pairs of semidetached houses were placed adjacent to each other. The block from Baldwin Street to South Place, 780 feet long, approaches the limit reasonably permissible where there is no serious topographical obstacle to cross streets. The block north of Lounsbury Street from Fairmount to Sylvan Avenue, 1,100 feet long, exceeds that limit, but the omission of any opening reserved for a future cross street is excusable because of the abrupt slope separating the Lounsbury Street lots from the undeveloped land to the north. A footway is possible on the school land.

Apart from the larger grouping which results almost inevitably from the curving street lines and the irregular grades, there is a frequently repeated symmetrical grouping of a pair of semidetached houses flanked at each end by a detached house, in most cases without variation in setback from the street. In gently sloping ground it is very effective and in general it produces a pleasant distribution of the longer and shorter building masses, given the numbers of each that were assumed to be economically desirable. In comparison with similar groupings, to be seen at some other projects, where the central building is set back considerably further from the street than the flanking buildings, the effect produced here by placing the front walls all on the same line, and relying for the effect of projection and recession upon the positions and forms of the porches and of the roof lines, is pleasanter from the artistic standpoint, and as a commercial proposition avoids the objection which some purchasers have to a house set further back than its neighbors. On the steeper slopes their grouping, symmetrical in plan, does not count as such in fact, and while the irregular compositions of roof line and building mass are often very pleasing, this appears to be due more to the admirable design of the individual buildings, their simplicity of treatment, and their general harmony of architectural quality than to any studied grouping.

In viewing this development as a whole, one notices particularly the effect of the shingle roofs,

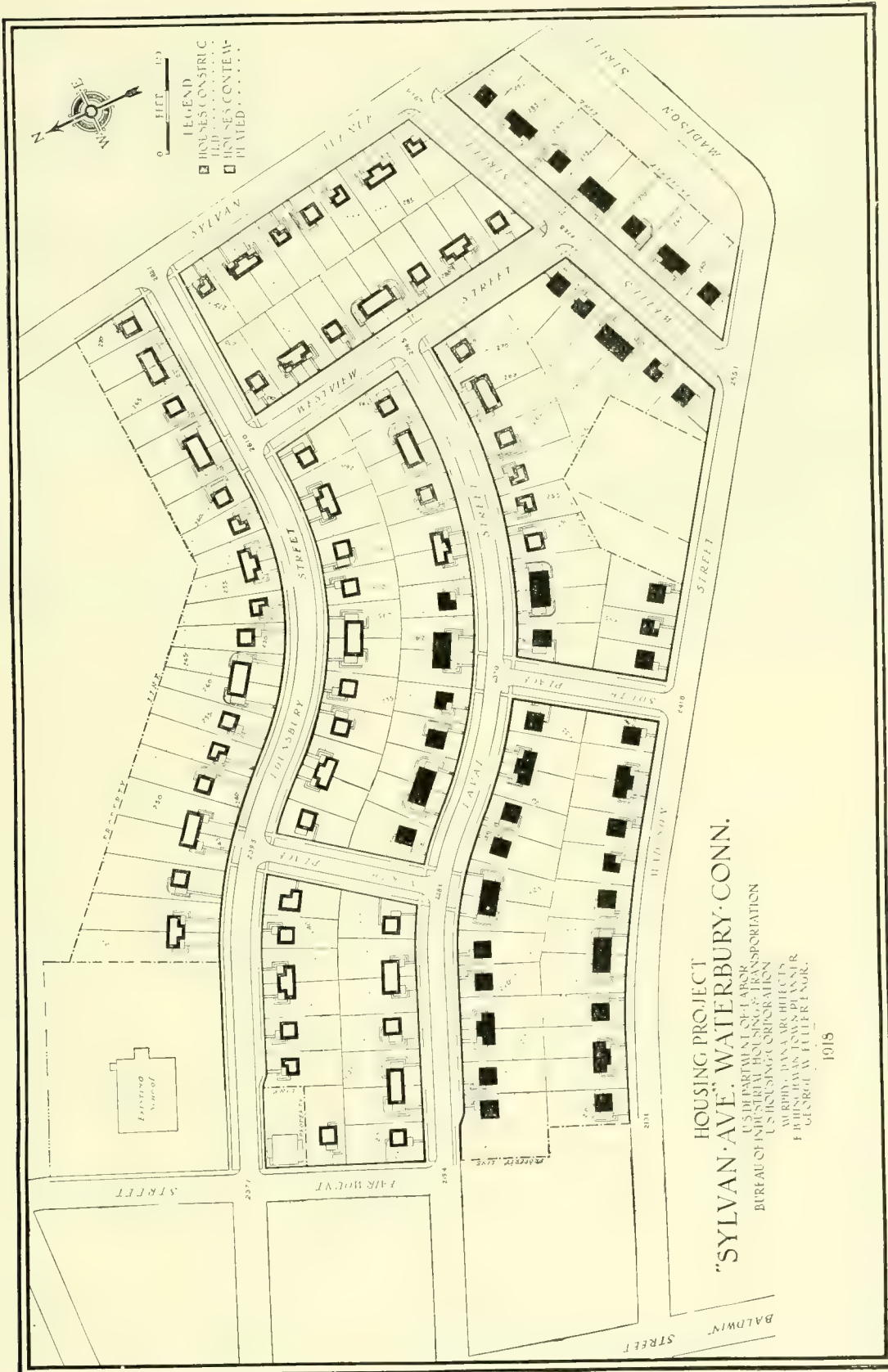
which, coming down to form the cover of the projecting porches, give to the houses the comparatively low appearance so much to be desired in houses of small plan area. One is also impressed by the fact that while but two type plans (five and six room houses) have been designed, nevertheless the variations of the exterior designs are such as to impart individuality to each different kind of house. The five-room type gave six different street fronts, four for single houses and two for semidetached, and the four-room type, three street fronts, making a total of nine different street fronts for the two types of plan. But all the houses are stuccoed, and in spite of the number of variants there is a sufficient uniformity of general style.

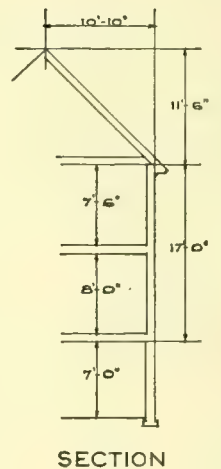
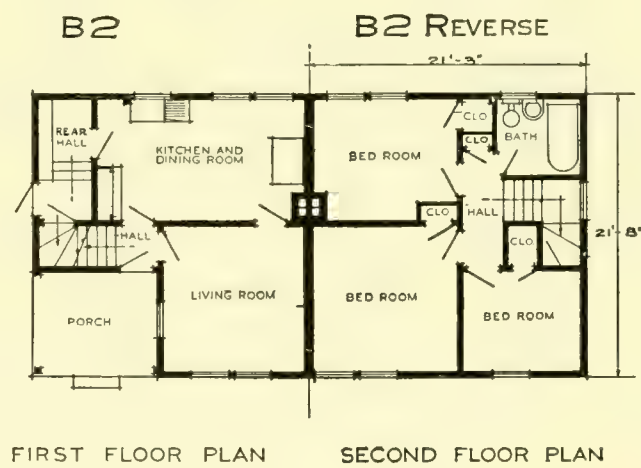
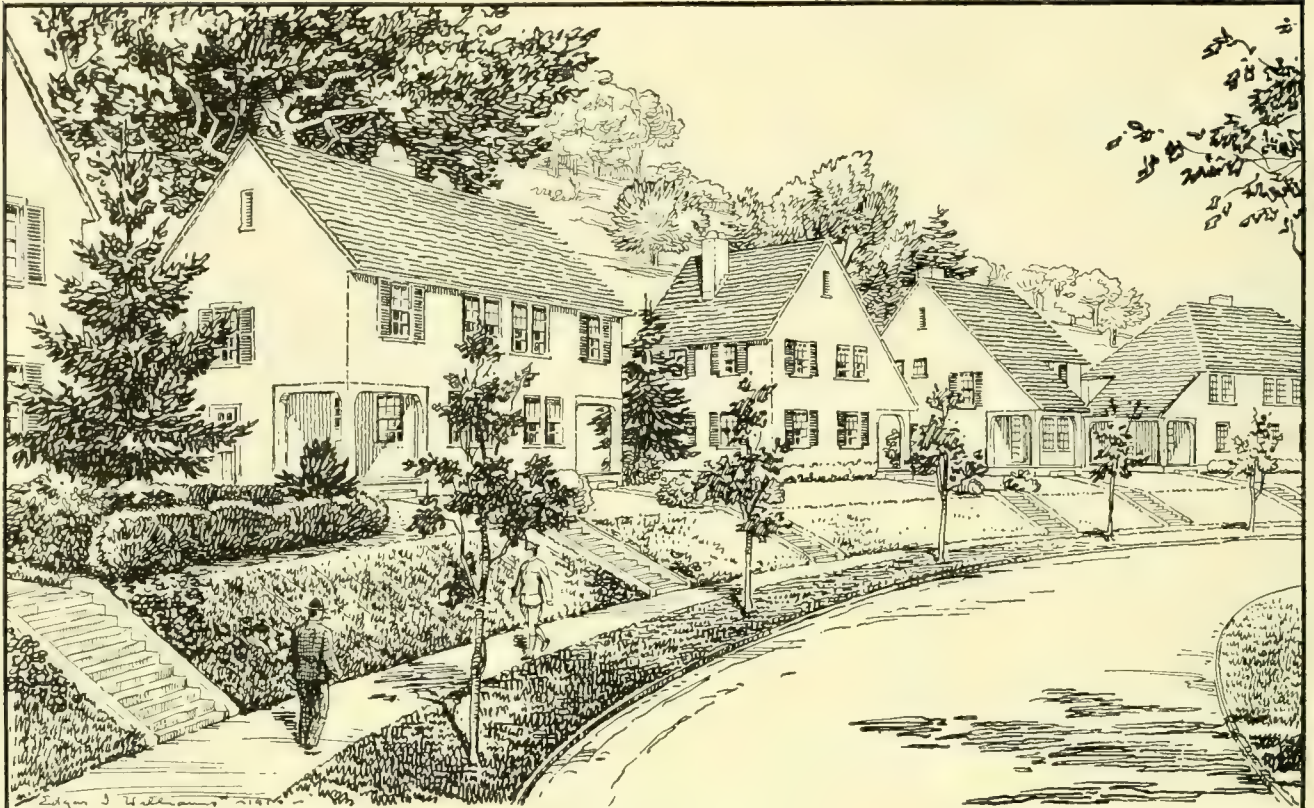
The groups of houses have individuality which is emphasized by the color selected for the woodwork of each group. One does not miss the lack of projection of the roofs along the gables, since the projections along the horizontal eaves are sufficient to cast a shadow on the face of the buildings.

A noticeably good departure from general practice is the omission of the trim on the outside of the window and door openings. This omission, besides being an economy, has the desirable effect of making the windows appear larger in scale. The idea seems to be generally applicable to houses where outside covering is stucco.

The plans of the houses are excellent adaptations of the corporation's standards, the staircases and hall being particularly well worked out in connection with the secondary entrance which, by its position, obviates the necessity of outside cellar area. The construction of the houses is also excellent and the general finish as good as war conditions would allow. Moldings, both inside and outside, are simple and refined. Inside stair railings are of proper proportions. Cellar windows have been provided with stone sills, and chimney flashings are well and neatly done. Altogether the houses of this project are very attractive in design and the construction thoroughly good. They rank among the best work done for the corporation.







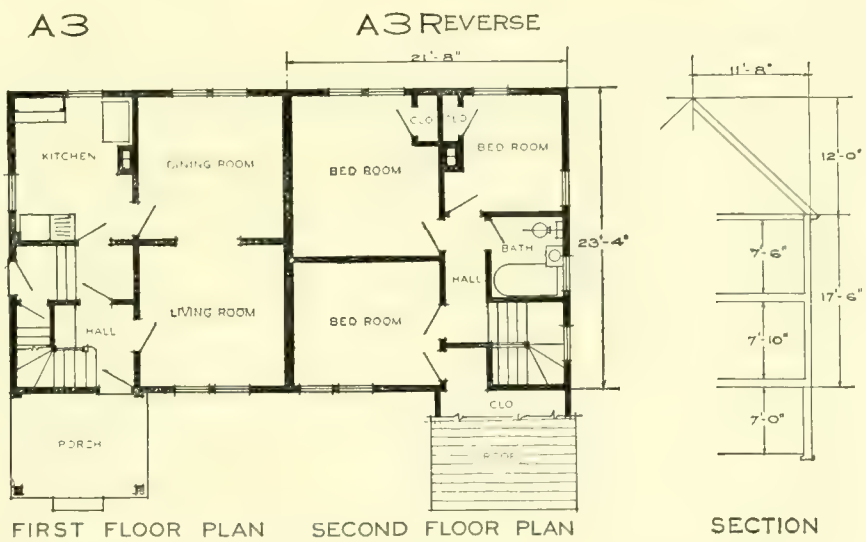
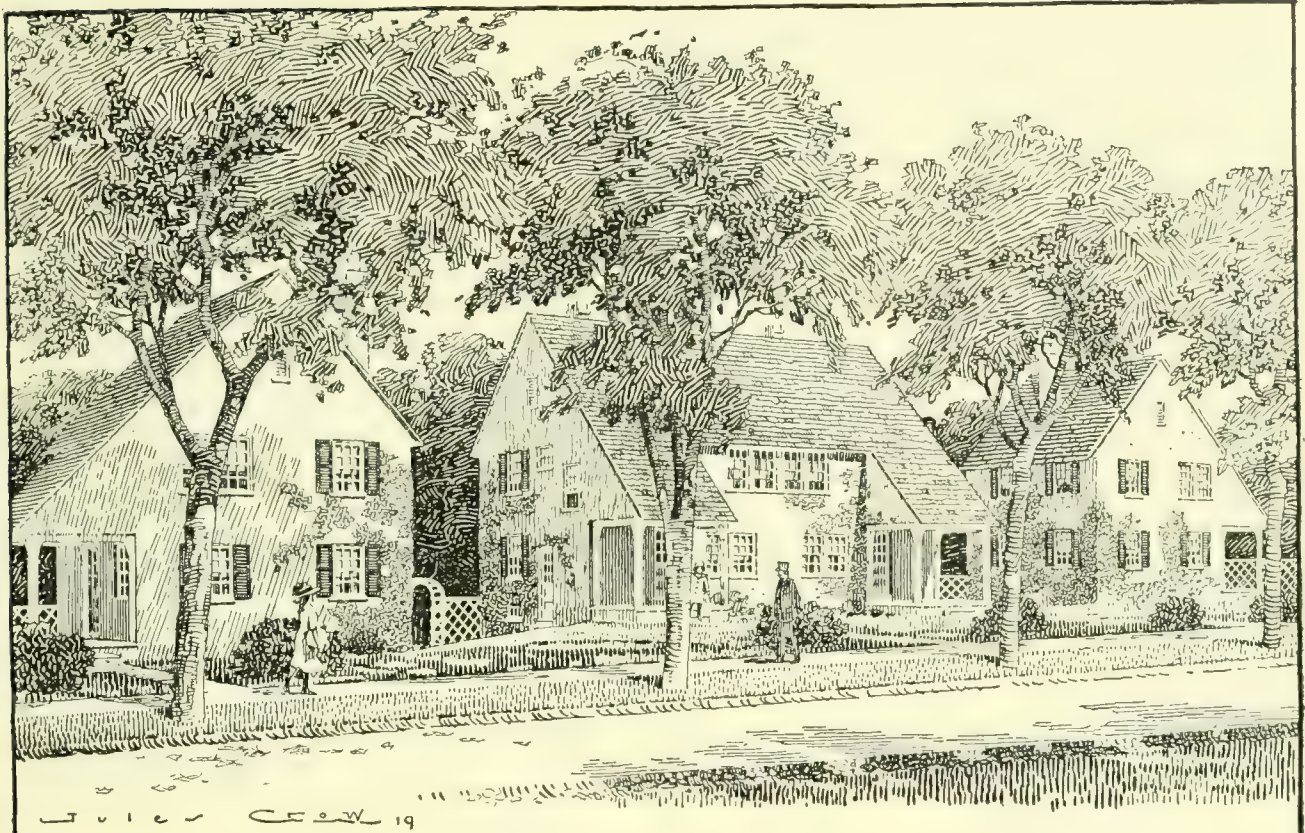
FIVE ROOM SEMI-DETACHED HOUSES TYPES B2 AND B2R

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT WATERBURY CONN

ARCHITECTS

MURPHY AND DANA

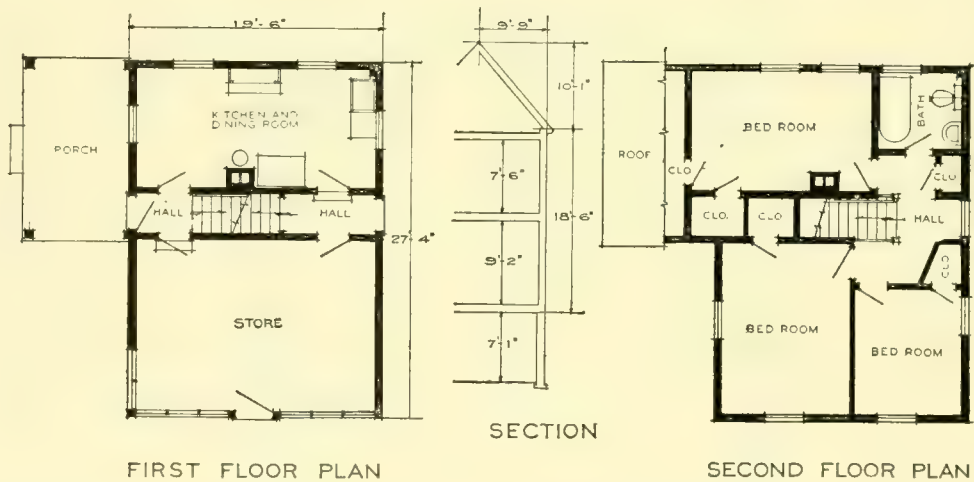
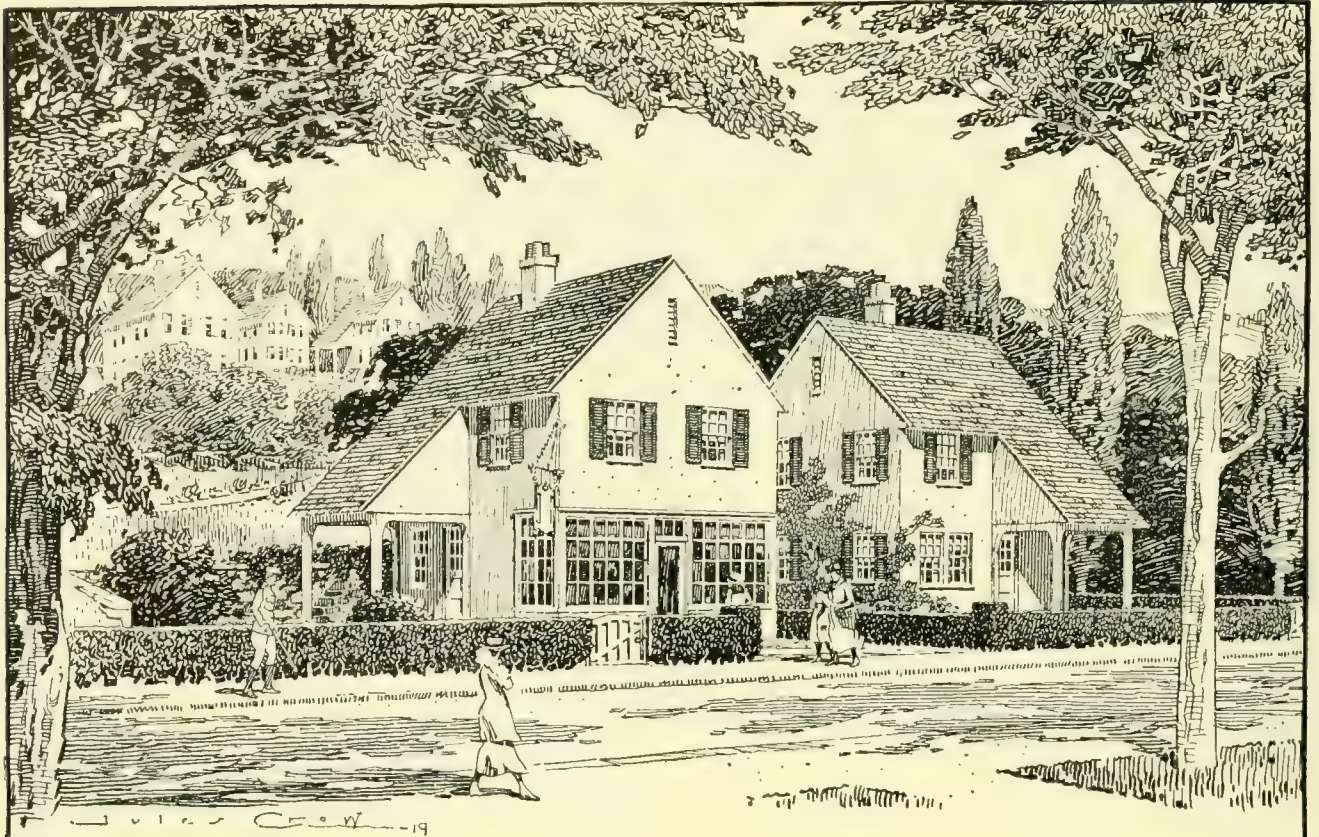


SIX ROOM SEMI-DETACHED HOUSES TYPE A3

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT WATERBURY CONN

ARCHITECTS MURPHY AND DANA



COMBINATION STORE AND DWELLING TYPE E

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT WATERBURY CONN

ARCHITECTS

MURPHY AND DANA

WATERTOWN, N. Y. (PROJECT NO. 389).

Area planned: 47.94 acres. Housing planned: Detached houses, 226 families; semidetached houses, 76 families; total, 302 families; dormitories, 205 persons. Housing constructed: Detached houses, 85 families; semidetached houses, 30 families; total, 115 families.

(For further information see tables, Chap. IX.)

The city of Watertown, N. Y., is located on the Black River about 100 miles north of Utica, and a few miles from the shore of Lake Ontario. It is a typical manufacturing city with approximately 40,000 inhabitants. The homes are of an attractive type, neither elaborate nor poor, and the city is generally inhabited by a good class of people who own their own homes and expect to spend their lives in the community. The principal industry is the New York Air Brake Co., which during the war has been engaged in the manufacture of munitions. There were numerous other industries, particularly those manufacturing brass and bronze goods, which were more or less directly engaged in war work. Because of the rather isolated situation of the city, the labor problem was very acute.

It was early decided that a considerable number of houses should be built at Watertown. A number of alternative sites were considered in detail, since all had disadvantages. Finally a site was selected on the northeast side of the city and west of the New York Air Brake Co. Some 60 acres of land were available, already in large part subdivided for building purposes and with a considerable number of scattered houses already constructed.

The site is entirely within the city limits and is not far from the down-town district by way of well paved and completely developed streets. It is also partially served by a street car line a short distance to the east.

It was intended that this development should be occupied by foremen and highly skilled workmen and their families, most of whom would be employed by the New York Air Brake Co.

The site is gently rolling for the most part but with an abrupt steep slope near the southeast corner and a low area near the northwestern boundary. The topsoil is a fair loam overlying gravel with some ledge in places not more than five or six feet below the surface.

The entire plan is of interest, showing first how an existing haphazard street system can be related to a larger district, and second, showing the much greater opportunities to secure the benefits of

town planning on open land as compared with that already platted. Several different and conflicting street and lot arrangements for the southern portion of the tract had been filed, and in fact officially accepted by the city, resulting in very unsatisfactory and confused conditions. It was not considered wise therefore to follow any of the earlier subdivisions exactly, an entirely revised scheme being substituted, making the best of conditions as they existed. A great deal of skill and patience was necessary in the real estate negotiations, and much time was necessarily expended both by the negotiator and by the designers, on account of the hampering effect of these existing conditions. Kathreine Street, which runs on lower ground from Mill Street to the plant, east and west through the center, is the axial street of the project. The resulting plan is not an ideal one, but it improves previous conditions in several respects, notably by carrying through Kathreine Street, with width enough for a future car line, to carry east and west traffic through the tract. Also, by buying and rearranging lots, Cleveland Street was opened at the foot of the hill at the southeast, thus connecting on easy grades the ends of Francis, St. Charles, and Stuart Streets and giving them a practicable outlet toward the air-brake plant. The old platting dedicated these streets through to Lillian and so to Grant Street on a simple rectangular plan regardless of topography, and would have involved climbing from 15 to nearly 60 feet by grades of 14 to 17 per cent, only to descend again by a grade of 9 per cent, all at the expense of heavy grading and without developing lots fit to build upon. It was the opinion of our real estate experts that the opening of Cleveland Street as shown added sufficiently to the value of our own lots on Francis, St. Charles, and Stuart Streets (about 80 per cent of the total lots on those streets) to more than pay for the acquirement of land for the street, including two houses, and for its construction, thus offering a striking instance of the economic advantages of a street layout adapted to topography as against conventional hit-or-miss rectangular platting on hilly ground.

The steep hillside above the Cleveland Street location was acquired cheaply; was used as a borrow pit to obtain filling material, and will be dedicated to the city as a park. The triangle left at the junction of Kathreine and Seymour Streets adds considerably to the interest and attractiveness of the development, and the site reserved for school and playground completes a good distribution of neighborhood public grounds.

The normal lot depth is 100 feet, according to local custom. The side space between houses in a few cases is the minimum of 16 feet, nowhere encroached upon by porches, but in most cases is 20 feet or more, giving a normal lot width of 40 feet for semidetached houses and 50 feet for detached houses. Some detached houses, especially those on abnormally deep lots, are given a lot width of only 45 feet, and a few lots from 70 to 90 feet deep are given a little more than a 50-foot frontage.

Much pains have been taken, in the completed portion, with the development of the individual lots. A hedge following the lot lines surrounds each building, whether single or semidetached. Each lot has its apple tree, shrubs, and vines.

The portion of this project nearer to the town having been begun first, since its utilities could be first completed, was for the most part so near to completion on November 11, 1918, that it was ordered finished. The rest of the project was canceled.

The grouping of the houses, in connection with their excellent design, affords probably the most agreeable solution to be found among the executed projects of the corporation of the difficult problem of small detached houses with a limited number of semidetached. They are frequently arranged in symmetrical groups of three, four, or more, some without variation in setback and others with the central portion of the group moderately recessed. In very few instances is the variation in setback overdone. There is one unfortunate instance on Hoard Street of a long grouping of houses symmetrical in its plan but badly related to the profile of the street, which forms a valley approximately symmetrical about a center just one lot distant from the center of the house grouping. There is also an awkwardness in the placing of the four houses on the south side of Kathreine Street at its important entrance from Mill Street. The pair of semidetached houses at the obtuse angle of Kathreine and Seymour Streets should have been

turned so as to bisect the angle and carry the building line around the bend, and the house on the corner of Mill and Kathreine Streets should have been advanced nearer the corner so as to relate more distinctly to the composition that is formed by all the other houses around the triangular open space of Kathreine and Seymour Streets, and so as to reduce the conspicuousness at this point of entrance of the old house on the next lot to the south.

The first impression of the houses is that they are diminutive. They are. But this is not a fault. With a certain type of plan given, and governed by certain dimensions and interior requirements, it would be a fault had these standards been exceeded in order that the house might have greater bulk or more imposing appearance.

The corporation set the standards as to area and number of rooms, an area about as small as comfort will allow. The architects have proportioned their elevations to the plan requirements.

With the exception of a few more or less minor details, the houses have been designed about as well as houses of this type and material could be. It would be difficult to pick serious flaws.

Opinions may differ as to the relative values of different plans but they are in sufficient number to suit different tastes. The exteriors, too, are of pleasing variety. The original development was to contain five plan types, Nos. 1 and 2 being five-room houses, and Nos. 3, 4, and 5 having six rooms. Each type has two different exterior designs, besides which there are four semidetached groups each formed by combining two of the above. This makes 14 different exterior designs.

Unlike many of the projects there is a happy similarity in style and a certain uniformity in roof line which, with the admirable grouping, gives a very satisfactory aspect to the development as a whole. Interest is added by varying the outside finish, some houses having clapboards differing in width from others, while still others are covered with shingles. Besides this the stain of the shingles and the painting of the houses differ as does the painting of porch lattices.

On this project there are, however, a few points which might be improved upon. The first is the street front of the semidetached No. 3 houses, which is rather too plain an elevation. Another flaw is the position of the porch at the rear corner of the

house. These two conditions coming together in the same house (No. 3 plan), detract much from this particular building.

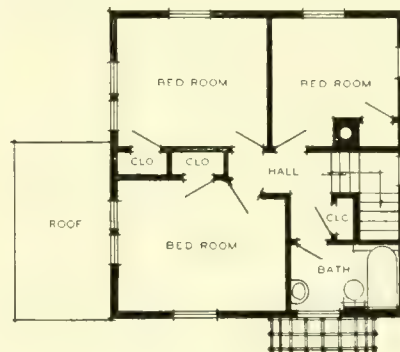
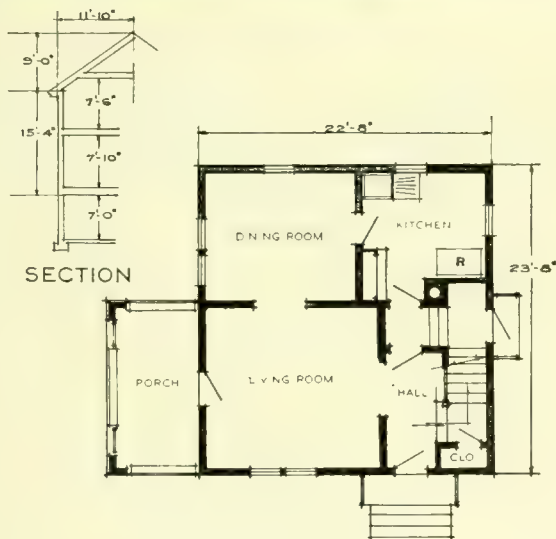
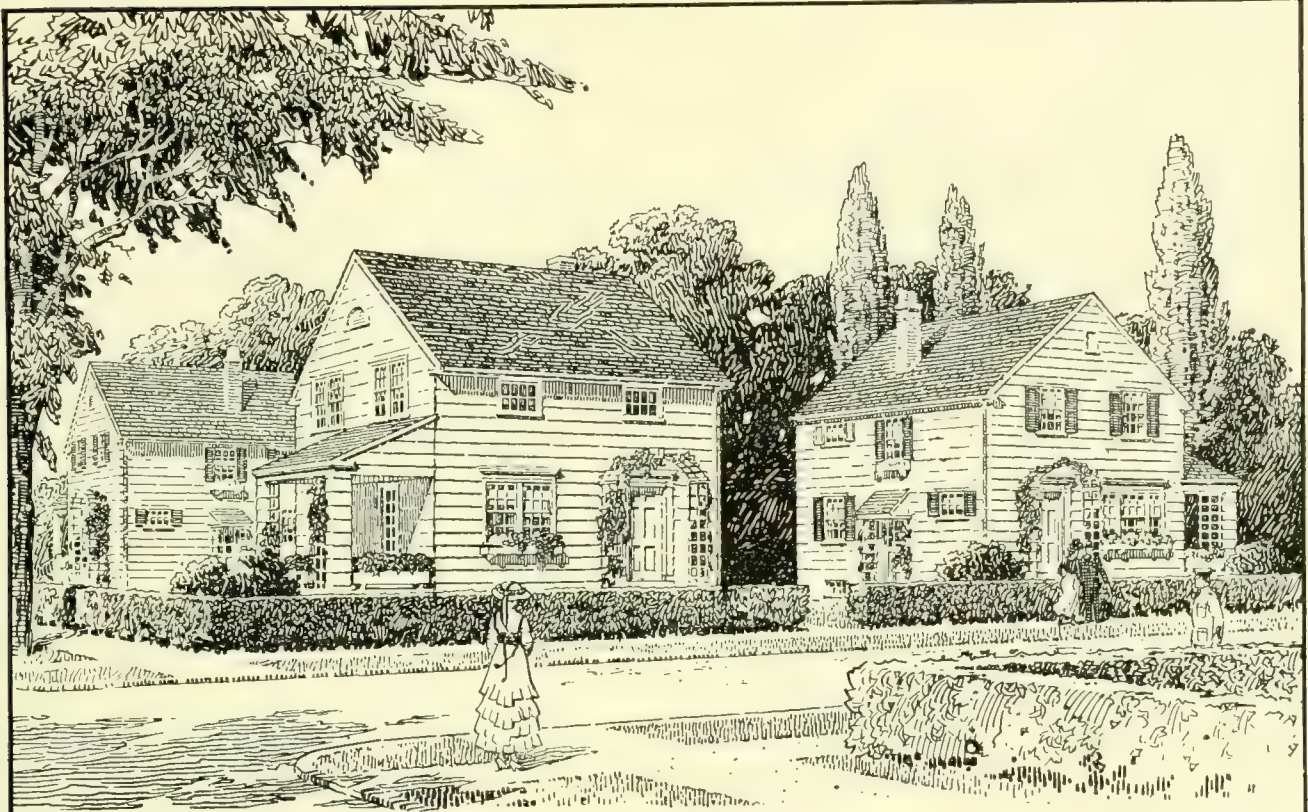
The No. 1 plan could be materially improved upon by enlarging the dining room about 2 feet, taking the space from the kitchen. A slight rearrangement of the kitchen fixtures would help accomplish this without detriment.

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The houses are very complete, containing convenient spaces for ice boxes, ample closets, easy stairs without winders, and complete plumbing; the kitchen contains a combination soapstone washtub and sink and a gas range.

The construction work is excellently done, even considering the class of material furnished under war conditions.

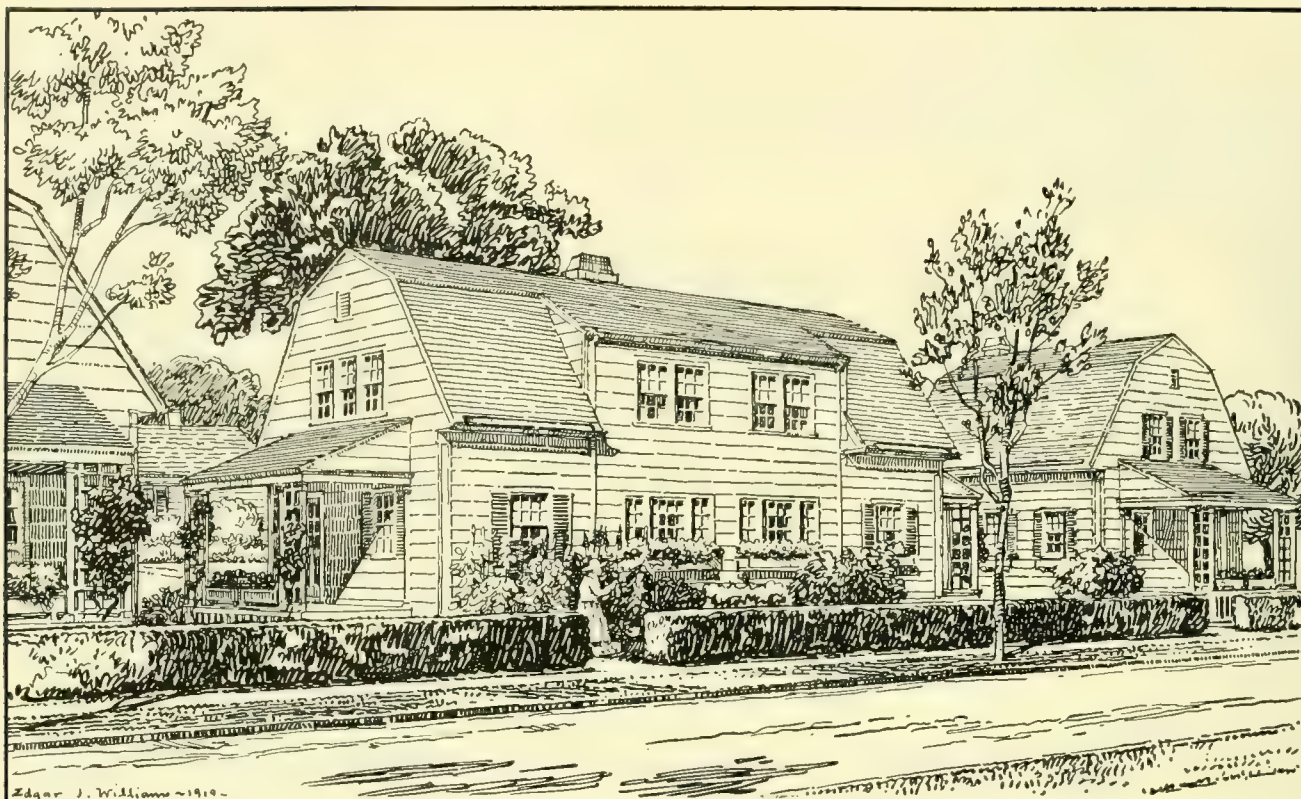




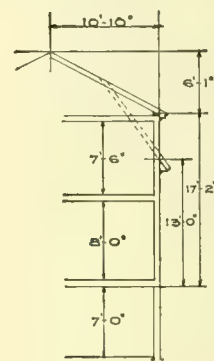
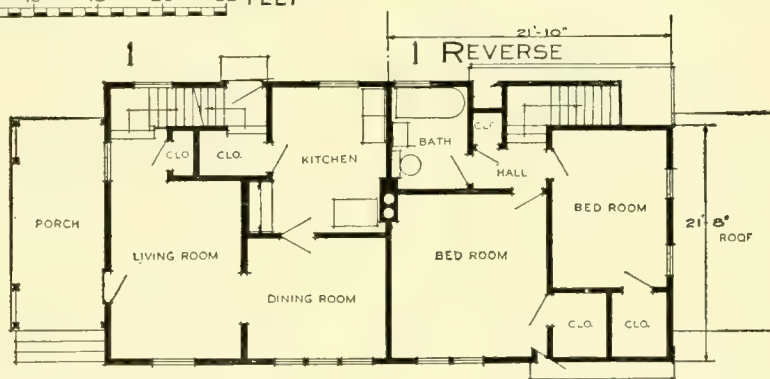
SIX ROOM HOUSE TYPE 3 A

SCALE 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION
 DEVELOPMENT AT WATERTOWN N Y
 ARCHITECTS DAVIS MC GRATH AND KIESSLING



SCALE 5 10 15 20 25 FEET



FIRST FLOOR PLAN SECOND FLOOR PLAN SECTION
FIVE ROOM SEMI-DETACHED HOUSES TYPES I AND 1R



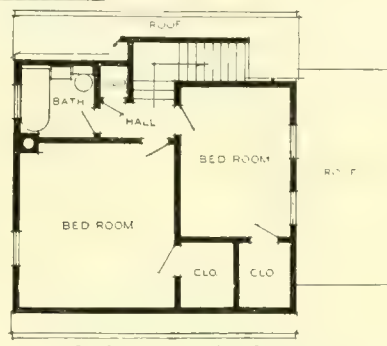
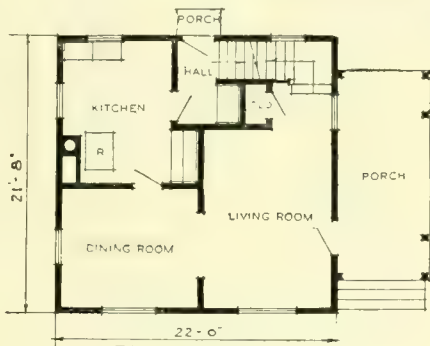
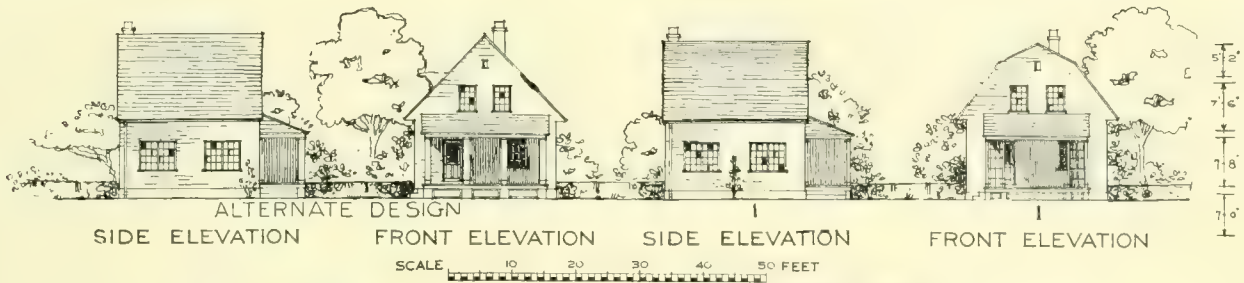
TYPES 1A AND 1AR SAME PLAN AS TYPES I AND 1R WITH EXCEPTION OF FRONT PORCHES

SCALE 10 20 30 40 50 FEET

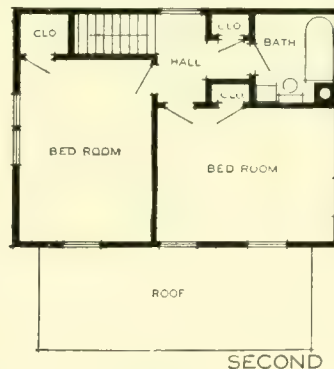
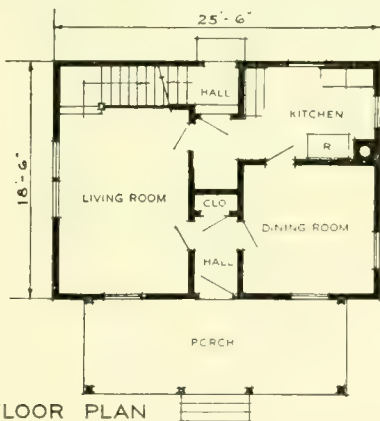
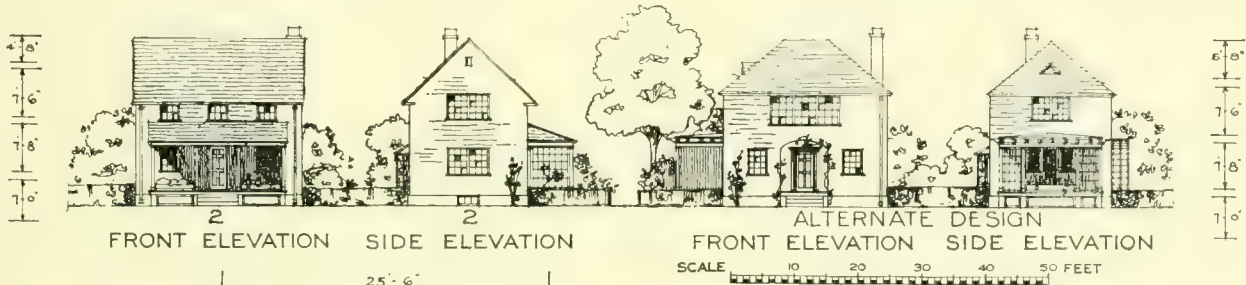
UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT WATERTOWN N Y

ARCHITECTS

DAVIS MCGRATH AND KIESSLING



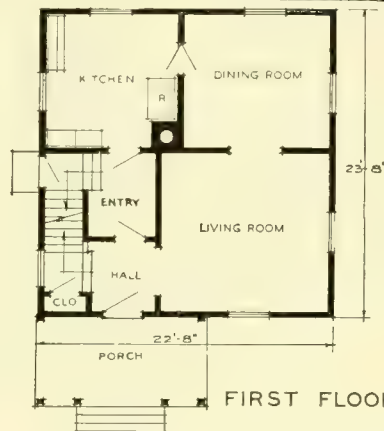
FIRST FLOOR PLAN
SECOND FLOOR PLAN
FIVE ROOM HOUSE TYPE 1



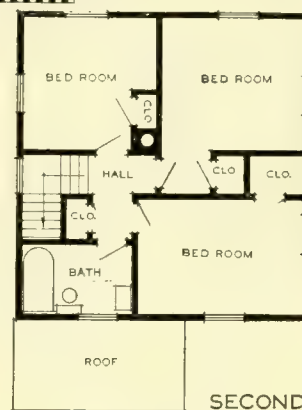
FIRST FLOOR PLAN
SECOND FLOOR PLAN
FIVE ROOM HOUSE TYPE 2

UNITED STATES HOUSING CORPORATION
DEVELOPMENT AT WATERTOWN N Y

ARCHITECTS DAVIS MC GRATH AND KIESSLING



FIRST FLOOR PLAN

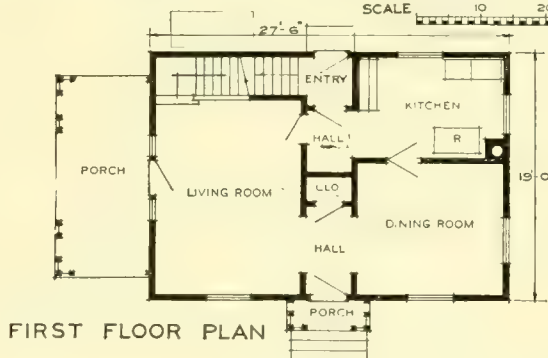
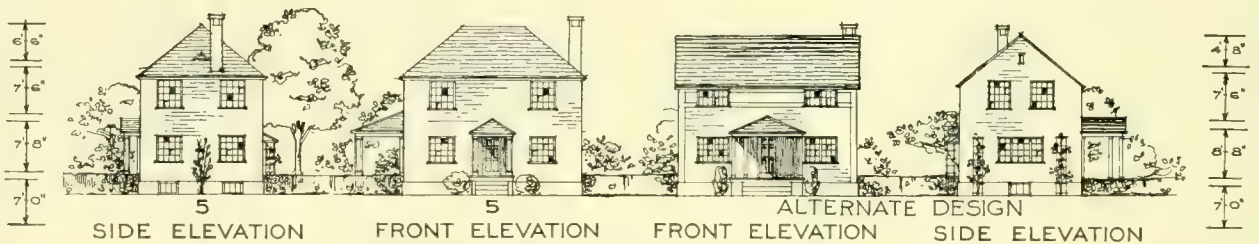


SECOND FLOOR PLAN

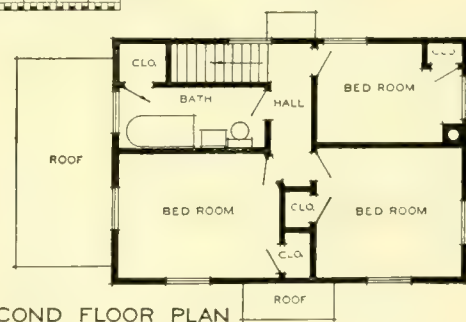
SIX ROOM HOUSE

TYPE 4

SCALE 0 5 10 15 20 25 FEET



FIRST FLOOR PLAN



SECOND FLOOR PLAN

SIX ROOM HOUSE

TYPE 5

SCALE 0 5 10 15 20 25 FEET

UNITED STATES HOUSING CORPORATION

DEVELOPMENT AT WATERTOWN N Y

ARCHITECTS

DAVIS MCGRATH AND KIESSLING



UNITED STATES DEPARTMENT OF LABOR

CHAPTER IX

TABLES I TO XI



REPORT OF
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
UNITED STATES HOUSING CORPORATION

CHAPTER IX.

TABLES.

The principal purpose of these tables is to set forth in compact form adapted to comparative analysis such data as will give a measure of the relative cost and value of the various projects planned by the United States Housing Corporation, particularly those housing families. This is accomplished on the one hand by estimating the quantities of the various component elements that go to make the complete project and on the other by gauging the service afforded to the occupants by the complete communities. In the time available only the most general statistics could be gathered and only the most readily deduced relations set down. However, it is hoped that this tabulation will also serve as a mine of information from which, in conjunction with the project illustrations and descriptions, many significant facts can eventually be dug out.

The tables are arranged to show first (in Table I) the nature and extent of the housing problem which confronted the Housing Corporation and how it was planned to meet it by construction and otherwise, and incidentally how this program was reduced in actual performance after the armistice.

The designs for development of the various housing sites are analyzed (in Table II) with respect to the broad relationships of types of use, residences, public areas, and streets; types of houses, detached, semidetached, row, and other buildings (in detail in Tables III, V, and VI); resulting densities of families per acre; and lot sizes.

The principal types of houses planned are compared (in Table IV) with respect to economy of plan in wall and hall space, and portion usable for living, sleeping, etc.

All improvements outside the buildings are grouped according to their financial relationships in four classes. In order to summarize the quantity data it was necessary to adopt a common denominator, since it is obviously impossible to add linear feet, square yards, and individual units. The only common unit of measure of all items is the dollar, but, inasmuch as the actual cost to the corporation, under war exigencies, varied greatly according to temporary local conditions and was materially

increased in very irregular ways by the requirement of extreme speed, a more useful comparison of plans has been made by using, instead of actual costs, only a few of which were ascertainable with precision, comparative costs computed on the basis of a single set of unit costs uniform for all projects and assumed for the sole purpose of these comparisons. These assumed unit costs have been set at a rough average of present day after-war prices. By altering the unit rate to fit known local conditions accurate local deductions can be made.

In the first class (Table VII) are included those general improvements which prepare the tract for development, clearing and heavy grading, and all street utilities and surface improvements which are ordinarily met by a direct capital charge on the property developed, either by contract work or through assessment by the city, such as sewerage, paving, and street trees.

In the second class (Table VIII) are placed such general improvements within the project as are ordinarily not paid for by the developer as a capital charge, but are provided by the city or a utility corporation in return for a rental or measured service charge, such as water, gas, and electricity. In the case of large developments some or all of these charges may fall on the developer at first, but this will usually be in the shape of a utility loan which will ultimately be refunded out of annual charges and will not "run with the property," to be met out of sale or rental.

In the third class (Table IX) are grouped such improvements outside the project as may be necessitated by local conditions, such as outfalls, supply mains, and disposal and pumping plants. The cost of these also is ordinarily refunded out of annual charges.

In the fourth class (Table X) are included a most important group, often lost sight of or slighted in early cost estimates, improvements on the lots, walks, house connections, lawns, planting, and fencing.

To summarize all the net capital costs entering into housing projects, the cost of the land planned has been added (in Table XI) to the cost of the

houses and improvements. In those cases, however, where there existed serviceable improvements previous to purchase of the land and where the right to use these improvements was covered in the price of the land, the actual amount paid for the property has been reduced by an amount equal to the figure (included in the tabulation of cost of all improvements) for those improvements which came with the land. Otherwise the cost of these improvements would be counted twice. The gross costs of the projects are also worked out, by adding to the net costs the cost of improvements to be refunded out of service charges and the cost of buildings other than houses, which would either be refunded by the municipality or earn their own capital requirements.

It should again be emphasized that these cost figures are on a basis assumed for comparison only and are neither at the maximum war rates nor at the low prewar rates, but merely represent a fair rough average of present-day after-war prices. In using the tables prefatory explanatory matter accompanying each should be carefully applied.

It will be noted that the total number of families "Proposed November 4, 1918" (Table I), "Planned to be housed" (Table II), "Number in dwellings of various types" (Table III), and number on which cost data are based (Tables VII, VIII, IX, X, and XI) differ, this being due to the fact that various phases of the designs for canceled projects were not equally completed at the time of the armistice. Inasmuch as these tables are not mutually interdependent and the tables are the more valuable the larger the body of data they are based on, it was deemed more instructive to include in each table data for as many projects as could be accurately ascertained.

In certain cases where convertible buildings were used first as dormitories or boarding houses, later to be made over into family dwellings, the number of families to be housed in the future does not appear in Table II, as it would result in counting the same building twice, since the housing of single workers at first housed in this building is already shown in this table.

SUMMARY.

For convenience in reference the totals of each table are given below:

TABLE I.—*Housing need and provision.*

Estimated housing need, workers to be accommodated under full war program:

Men.....	212, 733
Women.....	79, 916
Total.....	292, 649
Workers to be accommodated—	
By saturation.....	71, 935
By transportation.....	55, 530
	126, 565
Workers remaining to be housed.....	166, 084
Number of families to be housed.....	50, 350
Number of single workers to be housed.....	52, 850
Construction recommended by investigators:	
Families in houses.....	24, 539
Quarters for single workers.....	32, 651

HOUSING PROGRAM, 128 SITES.	PROPOSED NOV. 4, 1918.	REVISED APR. 18, 1919.
Number of families, including 3,965 families on sites for which plans were not made.....	24,070.....	6,148.
Number of single workers.....	12,865 men, 11,132 women.....	4,932 men, 3,375 women.
Number of families in permanent buildings.....	24,218.....	6,148.
Number of families in temporary buildings.....	752.....	
Number of single workers in permanent buildings.....	2,376 men, 2,435 women.....	594 men, 302 women.
Number of single workers in temporary buildings.....	10,489 men, 8,697 women.....	4,338 men, 3,073 women.
Number of families in houses.....	22,391.....	5,055.
Number of families in apartments.....	2,579.....	1,093.
Number of families in ready-cut houses.....	1,702.....	267.
Number of families in sectional houses.....	336.....	93.
Number of single workers in existing hotels.....	591 men, 815 women.....	244 men.
Number of single workers in new hotels.....	382 men, 3,566 women.....	350 men, 1,944 women.
Number of single workers in dormitories.....	11,125 men, 5,693 women.....	4,338 men, 1,301 women.
Number of single workers in buildings convertible into houses.....	324 men, 1,425 women.....	172 women.
Number of boarders in family houses.....	767 men, 1,058 women.....	130 women.

TABLE II.—*Town planning data.*

Area planned:	
Total, including one-half of boundary streets.....	acres. 5, 033. 40
Per cent physically suited for lots and streets.....	88. 38
Per cent in residential lots.....	54. 04
Per cent in lots for other buildings.....	4. 49
Per cent in public grounds on land suited for lots and streets.....	5. 07
Per cent in public grounds on land not suited for lots and streets.....	11. 62
Per cent in streets and alleys.....	23. 88
Lengths:	
Total length of streets.....	linear feet. 942, 628
Total length of alleys.....	do. 168, 729
Families:	
Total number planned to be housed, including 7,155 families on sites for which plans were not made.....	28, 160
Per cent in detached houses.....	43. 44
Per cent in semidetached houses.....	17. 09
Per cent in row houses.....	22. 09
Per cent in other buildings.....	15. 38
Number of single persons not in family houses.....	28, 745
Total number of people housed (basis, 5 per family plus boarders).....	172, 987
Estimated number of workers per family (including boarders).....	1. 7
Total number of workers to be housed.....	72, 553
Number of families per gross acre.....	5. 6
Average lot area (per family).....	square feet. 4, 208

TABLE III.—*Number of families in dwellings of various types:*

In 1-family houses:	
Detached.....	9, 543
Semidetached.....	3, 096
Row.....	5, 057
In 2-flat houses:	
Detached.....	440
Semidetached.....	368
Row.....	603
In apartment houses.....	
In 2-room dwellings.....	34
In 3-room dwellings.....	970
In 4-room dwellings.....	4, 404
In 5-room dwellings.....	4, 837
In 6-room dwellings.....	10, 143
In 7-room dwellings.....	277
In 8-room dwellings.....	306
Undetermined.....	1, 009
Total, including 978 families on sites for which plans were not made.....	21, 983

TABLE IV.—*Data on family dwellings and other buildings illustrated.*

Number of plans:	
Houses.....	178
Specials.....	
Total number of families in houses illustrated.....	5, 160
Number of stories high.....	1-3
Number of rooms per family.....	2-8
Average measurements (per family):	
Cubical contents (excluding porches).....	cubic feet. 14, 533. 2
Area at first story (excluding porches).....	square feet. 505. 2
Porch floor area.....	do. 89. 6
Area of all stories (excluding porches).....	do. 953. 6
Average percentages of total area:	
Per cent in walls.....	16. 34
Per cent in closets.....	3. 19
Per cent in halls.....	10. 84
Per cent in kitchen.....	11. 68
Per cent in dining room.....	7. 72
Per cent in living room.....	10. 37
Per cent in bath room.....	4. 10
Per cent in bed rooms.....	29. 76

TABLE V.—*Buildings for individuals and community buildings.*

Boarding house.....	Number 34	Number of lodgers.....	612
Dormitory.....	do. 373	Number of lodgers.....	26, 886
Hotel.....	do. 3	Number of lodgers.....	446
Cafeteria.....	do. 31		
Recreation building.....	do. 20		
Y. M. C. A., K. of C., etc.....	do. 6		
Y. W. C. A., etc.....	do. 6		
Total.....	do. 473		

TABLE VI.—*Auxiliary buildings.*

Theater.....	Number	8	Garage.....	Number	63
Church.....	do...	17	Railroad station.....	do...	3
Library.....	do...	2	Power house.....	do...	5
School.....	do...	18	Fire station.....	do...	5
Hospital.....	do...	8	Post Office.....	do...	1
Store.....	do...	254	Miscellaneous buildings.....	do...	9
Warehouse.....	do...	2			
Total.....				do...	395

TABLE VII.—*General improvements directly chargeable to project (including previous improvements).*

	Quantity.	Cost.	Cost per family.
Clearing.....		\$47,747.00	\$2.27
Heavy grading, at \$1 per cubic yard.....	1,751,899	1,751,899.00	83.40
Storm drains, at \$3.50 per linear foot.....	108,421	379,473.50	18.06
Combined sewers, at \$3.50 per linear foot.....	130,785	490,307.50	23.34
Inlets, at \$20 each.....	1,333	26,660.00	1.27
Manholes, at \$40 each.....	835	33,400.00	1.59
Sanitary sewers, 8-inch, at \$1 per linear foot.....	306,338	329,363.00	15.68
Sanitary sewers, over 8-inch, at \$1.50 per linear foot.....	123,549	185,323.50	8.82
Manholes, at \$40 each.....	1,995	79,800.00	3.80
Public grounds development, at \$600 per acre.....	341.79	205,074.00	9.79
Roadways:			
Class A, at \$3 per square yard.....	125,301	375,903.00	17.89
Class B, at \$2 per square yard.....	627,187	1,254,374.00	59.72
Class C, at \$1 per square yard.....	782,030	782,030.00	37.23
Alleys, at \$2 per square yard.....	122,410	244,820.00	11.64
Curbs, at \$0.80 per linear foot.....	528,014	422,412.00	20.11
Gutters, at \$0.50 per linear foot.....	141,934	70,967.00	3.38
Sidewalks, at \$2 per square yard.....	555,192	1,168,863.00	55.65
Planting strips, at \$0.25 per square yard.....	1,174,648	293,662.00	13.98
Street trees, at \$6 each.....	23,330	139,980.00	6.66
Total, 97 sites, 21,005 families.....		8,282,058.50	394.25

TABLE VIII.—*General improvements within project, cost to be refunded by annual charges.*

	Quantity.	Cost.	Cost per family.
Water mains:			
6-inch, at \$0.90 per linear foot.....	422,007	\$406,116.30	\$19.33
Over 6-inch, at \$2 per linear foot.....	190,222	380,444.00	18.11
Hydrants, at \$40 each.....	1,171	46,840.00	2.23
Hydrant connections, at \$1 per linear foot.....	14,229	14,229.00	.68
Valves, at \$20 each.....	1,786	35,720.00	1.70
Gas mains, at \$1.50 per linear foot.....	429,290	630,435.00	30.01
Electric wire:			
House lighting, at \$0.04 per linear foot.....	1,880,975	74,567.94	3.53
Street lighting, at \$0.04 per linear foot.....	796,525	26,764.84	1.27
Poles for wires, at \$30 each.....	6,411	193,618.00	9.22
Street lights, at \$20 each.....	1,556	31,120.00	1.48
Total, 97 sites, 21,005 families.....		1,830,855.08	87.59

TABLE IX.—*General improvements outside of project.*

	Quantity.	Cost.	Cost per family.
Outfall sewers:			
Storm, at \$3.50 per linear foot.....	5,241	\$18,343.50	\$0.88
Sanitary, at \$1.50 per linear foot.....	28,370	42,555.00	2.03
Combined, at \$3.50 per linear foot.....	1,508	5,593.00	.26
Manholes, at \$40 each.....	55	2,200.00	.11
Sewage disposal plant.....	5	30,800.00	1.90
Water mains, at \$2.50 per linear foot.....	41,402	103,505.00	4.94
Water pumping plant.....	4	40,500.00	1.88
Gas mains, at \$1.50 per linear foot.....	5,308	7,962.00	.39
Miscellaneous.....	13	71,165.00	3.39
Total, 97 sites, 21,005 families.....		331,623.50	15.78

TABLE X.—*Lot improvements, excluding buildings.*

	Quantity.	Cost	Cost per family.
Common roadways, at \$2 per square yard.....	17,831	\$35,662.00	\$1.70
Common walks, at \$2 per square yard.....	25,183	50,366.00	2.44
House walks, at \$1.50 per square yard.....	282,576	423,866.50	20.79
House connections:			
Sewer, at \$0.40 per linear foot.....	691,802	280,124.80	13.34
Water, at \$0.50 per linear foot.....	780,114	394,557.00	18.78
Preparing lawns, at \$0.25 per square yard.....	4,322,009	1,105,502.35	52.63
Lot trees, at \$2 each.....	20,337	40,674.00	1.94
Shrubs and vines, at \$0.50 each.....	254,393	127,196.50	6.06
Hedge, at \$0.30 per linear foot.....	350,630	107,891.70	5.14
Fence, at \$0.75 per linear foot.....	533,445	300,083.75	18.57
Clothes driers, at \$7 per family, rate based on 18,297 families.....	18,297	128,079.00	(7.00)
Total, 97 sites, 21,005 families.....		3,104,420.00	147.80

TABLE XI.—*Summary of costs assumed for comparison of projects for housing families.*

	Cost.	Cost per family.
A. Land planned for development.....	\$4,498,503.00	\$214.16
B. Bare land, excluding value of previous improvements.....	4,035,000.00	102.14
C. General improvements directly chargeable (including previous improvements) (Table 7)...	8,282,058.50	394.25
D. Lot improvements, excluding buildings (Table 10).....	3,104,420.10	147.80
E. Houses (assumed at 30 cents per cubic foot).....	91,890,653.45	4,374.70
F. Total for land and improvements directly chargeable (B, C, D, and E).....	107,302,932.05	5,108.93
G. General improvements, cost to be refunded (Table 8).....	1,839,855.08	87.59
H. General improvements outside of project (Table 9).....	331,623.50	15.78
I. Buildings other than houses (assumed at uniform cubage rates).....	3,903,750.00	185.85
Gross total (F, G, H and I) 97 sites, 21,005 families.....	112,388,260.63	5,308.11



	18	Charleston, W. Va.	1,250	1,000	250	5	50	445	3,000	1,200	1,200	600	250	100	b 85	b 85
1035		Chester, Pa.													a b 504	
2947		Eddystone	7,500	1,000			200	1,800	10,500			10,500	5,300	2,500	b 476	f 247
		Ridley Park														f 72
		Total	75	75	100			250				150	100	100	1,610	751
564		Cleveland, Ohio (Wickliffe)													a h 120	
243		Dayton, Ohio														
		Edgemont	2,400	3,000	600	120	280	1,000	8,000	1,500	4,000	2,500	1,250	1,000	b 800	
		Leo Street													b 200	
		Total	4,000	4,000	1,200		800	10,000	5,000	1,000	4,000	1,500	1,000	200	b 50	
244a		Elizabeth, N. J.														
		Site A													b 104	f 50
		Site B													b 50	
		Site D													b 50	
		Total													204	50
10		Erie, Pa.														
		East														
		South														
		West	2,400	4,100	1,640		315	1,785	10,300	5,000	800	4,500	1,175	1,350	b 185	b 60
		Total													b 700	f 93
457		Hammond, Ind.													b 457	b 257
		Total													1,350	93
578		Ilion, N. Y.														
1314		Indianapolis, Ind.	200	2,000			1,000		3,000	1,200	1,800	450	900	200	b 110	f 168
496		Indianhead, Md.	200	630	470		250	550	1,000	800	200	200	200	200	200	f 198
697		Kenilworth, N. J.							1,300	200	100	1,000	300	150	b 100	a h 99
		Site C														
		Site D	75	600	325		1,000		2,000	1,000	1,000	200	600	80	f 75	f 25
		Site E														
3485		Kings Mills (Cincinnati), Ohio		800			1,500		2,300	300	2,000				b 44	f 100
		Total													a h 500	f 600
398		Lowell, Mass.	300	1,500	1,200	60	600	2,340	6,000	3,700		2,300	900	500	300	300
398a		Dormitories— B. & M. R. R. Site High School Site														
		Houses— High Street Extension Livingston														
		Total														
2972		Lyles (Wrigley), Tenn. Colored		350												
		Total														
581		Mare Island (Vallejo), Calif.														
		Houses	980	1,470			50		2,500	1,300		1,200	640	400	600	b 107
		Dormitories														c 120
		Total														a h 400
381		Milton, Pa.														
		Dormitories	700	250	75		15		1,010	10	130	780	240	300	250	b 107
		Stephens Street Site B														c 120
		Total														a h 400
907		Muskegon, Mich.														
		St. Gertrude Schenberg	1,200	2,000	800		1,500		5,500	3,500		2,000	200	1,500	200	b 171
		Total														b 29

a In temporary buildings. b In houses. c In apartments. d In ready-cut houses. e In existing hotels. f In dormitories. g In buildings convertible into houses. h Pearders in family houses.

TABLE I.—Housing need and provision—Continued.

Estimated housing need.													Housing program.							
No.	Project.	Workers to be accommodated under full war program.						Workers to be accommodated by—		Workers re-maining to be housed.	Num-ber of fami-lies to be housed.	Num-ber of single work-ers to be housed.	Construction recommended by inves-tigators.		Proposed Nov. 4, 1918.		Revised to Apr 15, 1919.			
		Wages per week.						Sati-sfaction.	Trans-por-tation.				Fami-lies in houses.	Quar-ters for single work-ers.	Single workers.		Single workers.			
		Men.		Women.											Fami-lies.	Wom-en.	Men.	Wom-en.		
		Over \$30.	Under \$30.	Over \$30.	Under \$30.	Under \$20 to \$30.	Under \$20.												Fami-lies.	Wom-en.	Men.	Wom-en.
880	Neville Island, Pa. Coraopolis.	6,000		3,000				1,000	8,000	4,000	Indefinite.	62,000 b 65								
	Total.											2,065								
271 1371	New Brunswick, N. J. New Castle, Del.	250 100	650 400	300 20	100 400	880	1,050		1,270 900	300 33	200 6	300 400	b 192 b 13	a h 100 a h 188 h i 74	a h 200 a h 188 h i 74					
	Total.											13	262	262	188	188				
157	New London, Conn.									446			b 116							
722	New Orleans, La.	250	425	175		450				180			b 25							
382	Newport, R. I.	750	100	150						350			b 104							
	James-town, Va.												b 10							
57a 57b 57c	Newport News, Va. Hilton Extension. Dormitories. Black Ends. Briarfield.	3,000	3,500	1,000		250	2,800		5,200	1,600			b 493 a h 1,092 b 253 b 550							
	Total.												1,206	1,548						
404	Niagara Falls, N. Y.: Site A. Site B. Site C.	400	2,400	650		10	2,000		2,600	1,000		390	b 125 b 104 b 62	i 72 b 36	b 190					
	Total.												381	108	106					
481 1303	Niles, Ohio. Norfolk District. Craddock, Va.	3,900	2,275	325		60	4,500		3,300	1,275		400	b 115							
	Total.															b 75				
150b	Glenwood Park, Va.	4,000	3,000	500			1,000		6,500	3,000		2,400	b 562 c 104 c 124 b 562 c 86	a b 2,000 a b 104 a b 2,000 a b 93						
150c	Truxtun, Va.												b 250							
	Total.												2,131	2,032	1,009	2,000				
370i 840 460 471	Paulsboro, N. J. Pensacola, Fla. Perth Amboy, N. J. Philadelphia, Pa.	900 20 200	1,300 430 1,000		75 1,000	600	400		1,175 2,300 300 1,900	400 225 200 400	300 475 30			a h 300 a h 475 b 50 c 154						
503 503a 153b	Naval yard, Oregon Avenue. Pentrose Avenue. Tacoma.	1,300 500	2,500 825	2,000 50		80	500		5,400 1,875	1,900 950	832 400		b 600 a b 1,105 b 298							
	Total.												2,063		650					
588 2125	Phillipsburg, N. J. Pompton Lakes, N. J.	300 1,000	900 540		15	60	1,175		900 1,400	300	575 50		b 50	a h 475 h i 120	a h 475 a h 760					
2990	Port Penn, Del. (third site)								3,000		New town.		d 400	a h 965 a h 760						
604	Portsmouth, N. H. (Kittery, Me.)	580	610	135		100	350		1,375	200	75	1,000	c 30 b 50 i 244	a h 150 b 244	i 244					
	Total.												50	394		244				

2728 141	Portsmouth, Ohio (second site). Wash. Inside. Outside. Total.	4,350	1,100	50	250	250	6,000	500	5,500	2,000	1,000	Great need.	b 250 c 45 d 350 b 300	245	350
62	Quincy, Mass.: Arnold Street. Baker Yacht Basin. River Street. Dormitories. Total.	2,450	4,550		7,000	250	6,750	1,000	500	1,000	500	1,000	b 127 b 18 c 218 b 59 a b 966	422	906
216c	Rock Island district. Davenport, Iowa— McManis. Park Lane. Moline, Ill. East Moline, Ill.— Deere. Highlands. Rock Island, Ill. Total.	2,300	3,475	1,925	25	325	1,000	500	4,000	4,550	1,750	500	1,275	150	
4368 118 471a	Seven Pines, Va. Sharon, Pa. South Amboy (Ernst), N. J.	1,400 375 208	650 3,040	185 256	4,000 20 3,145	5,400 1,500 6,649	2,200 500 3,000	2,200 500 3,000	3,200 1,000 3,649	226 225 800	2,700 550 2,000	2,000 600 1,000	a h 285 a h 15 a b 110 c 76 b 186	a h 725 d 198	a b 95 a h 60
2708	South Bend, Ind. Stanford, Conn.: Site A. Site D. Staten Island, N. Y., Apartments Houses. Total.	2,500 1,500 900 2,200	2,500 1,500 2,750	550		4,000 240 3,145 1,500 2,400 5,500	3,700 1,200 1,200	2,950	1,350	300	240 600 300	50 72 104 b 72	d 20 a h 150 c 36		
130	Tullytown, Pa. Warren, Ohio: Northeast. Southeast. Total.	250	700	50	125	2,375	3,500	1,700	1,800	450	550	200	d 69 a h 150	a h 150	a h 150
27a 27b 27c 27d	Washington, D. C., district: Navy Yard— Apartments. Houses. Dormitories. Extension. Residence halls— Capitol Site. Capitol Site. Twenty-first and B Streets. Bureau of Standards. South Capitol Street. Total.	1,800	3,240	200	200	5,500	500	5,000	5,000	1,250	2,500	903 946 1,000	c 398 b 267 a h 475 61,000	a h 475	a h 475
54a 54c 51f 51g	Steel & Ordnance Co. Waterbury, Conn.: Chase. Sylvan Avenue. Watertown, N. Y. Watervliet (Troy), N. Y. Woodbury, N. J. Total, 128 sites.	600 900 600 2,800	200 4,400 2,200 1,960	200 350 1,200 840	200 420 30 20	1,000 7,350 5,000 6,200	10,000 3,600 2,350 2,980	5,000 300 600	15,000 250 50	12,000 600 700 610	250 50 250	15,000 270 270	a, g 972 		

* Includes 3,963 families on sites that have not been planned.

† In buildings convertible into houses.

‡ In new hotels.

§ In sectional houses.

|| In ready-cut houses.

¶ In temporary buildings.

* In houses.

TABLE II.—Town planning data.

"Area planned" is that for which the town plan was completed with sufficient exactness to determine the number of houses of various types as indicated under "families," and is often larger than the area contracted for or definitely proposed for construction. All tabular data cover this area, except on Table I and in a few other cases where noted elsewhere.

Lengths of streets are measured on center lines, but include street intersections once only. Both on acreage tracts and city lots, boundary trees and alleys (that is, those with property on the opposite side owned by others) are tabulated at half their actual length.

"Number of people housed" includes single workers not in family houses plus an estimate of the occupants of family houses based on the assumption that the average family will have five members, with the head of the family a wage worker and that one-half the families will include another worker. Where, owing to local conditions, the estimated number of workers per family exceeds one and one-half, this excess is considered to consist of boarders, and the "number of people housed" is increased by the same number.

No.	Project.	Area planned.				Lengths.			Families.				Total number of people housed (basis, 5 per family, plus boarders).	Estimated number of workers per family, including boarders.	Total number of workers to be housed.	Number of families per gross acre.	Average age of family, square feet.
		Total, including one-half of any streets, acres.	Per cent. physically suited for lots and streets.	Per cent. in lots for buildings.	Per cent. in public grounds and land suited for lots and streets.	Per cent. in streets and alleys.	Total length of streets and linear feet.	Total length of alleys, linear feet.	Total number of planned houses.	Per cent. in detached houses.	Per cent. in row houses.	Per cent. in other buildings.					
56	Aberdeen, Md.	26.53	93.85	77.26	1.51	6.15	15.08	4,120	600	100.00			60	330	162	3.0	11,162
185	Alabama nitrate district.																
337	Baltimore, Md.	25.49	100.00	77.36	.16		22.48	5,272	1,432	77.23				615	185	4.9	6,984
1165	Shedfield, Wis.	27.63	100.00	74.05			25.95	5,678	940	113	75.65			363	170	4.0	7,042
621	Wiscumunda, Ohio	13.78	100.00	33.91	11.01		23.87	2,680	1,680	100.00				260	78	3.8	6,919
	Albany, Ohio	9.20	100.00	69.64			30.36	2,450	52	100.00				210	15	5.6	5,420
354	Northwest, Ohio	62.10	72.27	61.11	1.30	27.73	20.05	9,975	1,812	213	100.00			1,065	320	3.4	6,237
	Alton, Ill.																
	Broadway, Ill.	6.62	100.00	66.46			33.54	1,172	340	100.00				273	73	7.3	3,903
	East Alton, Ill.	2.61	100.00	80.08			19.92	150	476	200	41.00	43.00		75	22	7.1	3,908
59	Milton Hill, Me.	36.67	81.31	45.27	1.69	19.09	31.61	8,121	120	82.22	17.78		486	1,486	75	7.7	9,516
3933	Bath, Me.	9.11	100.00	73.74	1.61		21.62	3,260	90	100.00				195	180	9.8	2,262
24	Boyle, W. Va.																
102a	Bridgeport, Conn.	170.80	98.21	61.49	4.13	1.76	21.92	33,560	800	1,258	18.28	74.03		6,290	1,87	7.3	3,820
	Houses.																
102	Black Rock (1), Conn.	6.75	100.00	70.00			29.10	1,716	216			100.00		1,080	15	31.9	968
	Crane (1), Conn.	3.02	100.00	61.57			35.13	956	108			100.00		510	15	162	787
3480	Crane (2), Conn.	21.22	100.00	65.56	1.37		31.07	6,731	377		1.50	68.70		1,885	15	15	1,930
565	Grasmere (12), Conn.	9.77	100.00	75.33			21.67	2,194	101	.99	30.69	19.80		505	15	131	3,174
18	Mill Green (5), Conn.	11.51	87.84	65.68		12.16	26.16	2,155	111	3.60	30.63	18.92		375	15	166	3,167
	Mill Green Cemetery (1, 2, 3, 4, 5, 6, 7, 8, 9, 10), Conn.	8.72	100.00	70.64	1.15		28.21	2,117	96			20.83		480	15	111	2,795
102a	Temporary Flats—																
	Century Site	8.60	100.00	79.52			29.48	1,972	760			100.00		1,060	15	318	1,420
	Hill Top, Conn.	8.15	100.00	75.50			21.50	2,772	188			100.00		910	15	282	1,478
3480	Durham, Mich.																
436	Burlington, Mich.	21.96	100.00	73.77			21.23	1,650	700	100.00			100	1,360	15	15	1,311
565	Charleston, S. C.	39.74	18.06	55.30	2.28	8.81	25.30	8,650	167	17.37	82.63			835	15	230	2,211
18	Charleston, W. Va.	16.28	87.35	55.77	4.79	1.05	12.65	3,606	87	87.18	15.98		30	498	2.0	312	4,414
1635	Chesler, Pa.													435	15	130	4,546
	Eddystone, Pa.	167.13	68.32	40.80	5.11	.90	31.71	685	1,128	.18	11.88	81.71		7,857	3.0	2,166	2,558
2947	Kelley Park, Pa.	51.13	83.83	52.80	6.35	.11	21.15	12,299	365		10.62	85.49		3,672	3.0	1,653	2,210
564	Cleveland (Wickeluth), Ohio	1.13	100.00	90.26			9.71	108					124	121			
213	Edgemoor, Ohio	107.95	76.36	51.96	.67		23.64	17,522	787	22.24	37.61			3,935	1.5	1,180	3,218
	Edgemoor, Ohio	3.34	100.00	63.57			31.13	894	435			100.00		200	1.5	60	2,385
244a	Elizabeth, N. J.																
	Site A.	6.30	100.00	74.60			25.46	1,000	50					250	1.5	75	4,095
	Site B.	3.72	100.00	61.33			35.67	1,089	104		100.00			320	1.5	136	1,511
	Site D.	6.99	100.00	75.25			21.75	1,124	50					230	1.5	75	4,583
10	Eric, Pa.																
	East.	27.26	91.50	69.51			23.59	6,130	223	16.50	26.91			1,115	1.5	331	3,702
	South.	112.62	87.93	52.78	1.76		21.09	27,800	825	11.91	45.88	29.00		4,125	1.5	1,237	7,131
	West.	71.99	91.76	62.02	2.64	.79	26.31	16,070	3,066	19.04	31.17	40.08		2,495	1.5	718	3,798
457	Hammond, Ind.	19.35	100.00	76.93			23.97	4,125	174	49.13	20.89			918	1.9	339	3,765
578	Heron, N. Y.	3.85	100.00	72.03			26.05	4,103	130	69.23	30.77			810	1.5	335	4,348
1314	Indianapolis, Ind.	180.80	83.30	41.58	10.13		19.71	900	190					198	1.5	198	5,346
496	Indianapolis, Ind.	106.50	96.77	46.67	15.30	3.30	26.50	16,870	82	76.84				2,130	1.5	1,709	11,639
406a	Dahlgren, Va.																
607	Kendworth, N. J.																
	Site C.	.67	100.00	71.64			28.36	215						78			
	Site D.	.20	100.00	58.62			41.38	137						26			
3485	Kings Mills (Cincinnati), Ohio.	5.25	100.00	71.62			28.38	1,070	52					200	1.5	78	3,150

TABLE II.—*Town planning data—Continued.*

No.	Project.	Area planned.				Lengths.				Families.					Total number of people housed (basis, 5 per family, plus boarders).	Total number of workers per family, including boarders.	Total number of workers to be housed.	Number of families per gross acre.	Average lot area per family, square feet.
		Total, including one-half bounded area for streets and acres.	Per cent physically suited for lots and streets.	Per cent in dental lots.	Per cent in other lots, buildings.	Per cent in public grounds on land not suited for lots and streets.	Per cent in streets and alleys.	Per cent in streets and alleys.	Total length of streets and linear feet.	Total length of planned detached houses.	Total number of planned detached houses.	Per cent in row houses.	Per cent in other buildings.	Number of single persons not in family houses.					
140	Staten Island, N. Y.: Apartments.	77	100.00	70.13			29.87	205		36				180	1.5	54	46.7	650	
107 118	Tulsa, Okla. Warren, Ohio	9.25 43.57	100.00 100.00	72.97 42.46			27.03 14.07	18,000 11,975		78 129				400 1,245	1.5 1.5	120 793	8.4 7.4	3,770 4,575	
	Northeast Southeast	10.66 7.02	91.93 100.00	71.01 78.35		28	20.64 21.65	1,910 1,285		52 47	61.54 74.47	38.46 25.53		260 235	1.5 1.5	78 70	4.9 6.7	6,341 5,097	
27a 27b 27c 27d	Washington, D. C., district: Navy Yard— Apartments. Houses. Dormitories.	14.33 22.73 18.84	100.00 100.00 100.00	27.50 39.54 17.98	2.47 1.97 8.86	17.93 24.35	52.10 48.81	2,636 4,478 3,059		308 274 1,000				1,540 1,370 5,000	1.5 1.5 1.5	462 411 1,500	21.5 12.1 11.5	559 1,429	
	Navy Yard Extension— Residence Hall— Station Site. Capitol Site.	86.93 7.55 8.86	..... 100.00 100.00	..... 62.84 54.40	..... 11.10 18.06	..... ..... .....	..... 26.06 34.54	..... 1,015 1,196	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	..... ..... .....	..... 972 972	..... ..... .....	..... 972 972	..... ..... .....	..... ..... .....
54c	Twenty-first and B Streets.	11.87	100.00	72.62	8.34		19.04	3,072	847	336				1,622	1.5	2,126	51.1	546	
54d	Bureau of Standards.	9.03	100.00	60.00	13.53		26.47	993	102	106				625	1.0	268	22.6	1,156	
54e	South Capitol Street.	7.09	100.00	44.62	4.08	2.36	49.24	1,806	1,438	201				1,005	1.5	301	28.3	681	
54f	Steel & Ordnance Co.	10.50	99.20	55.77	8.0		43.43	1,802	800	50	24.00	76.00		164	1.5	223	7.0	3,448	
380	Waterbury, Conn.: Chase—	11.39 18.11	88.59 100.00	63.48 75.21		3.34	21.77 24.79	2,157 4,045		70 135	67.14 50.37	31.43 48.89		371 715	1.8 1.8	126 213	6.1 7.5	4,499 4,395	
	Sylvan Avenue. Watertown, N. Y.	47.94 13.29	94.86 100.00	64.33 63.58		83	6.14 7.98	11,170 2,800		302 91	74.83 60.44	25.17 39.56		205 150	1.5 1.5	658 605	6.3 6.4	4,448 4,045	
136	Watervliet (Troy), N. Y. Woodbury, N. J.	17.92	100.00	91.09	5.91					930				930		930		.....
	Total, 128 sites.	5,033.40	88.78	54.04	4.49	5.97	11.62	942,628	168,729	128,160	43.44	17.99	22.99	15,788	1.7	72,553	5.6	4,208	

Includes 7,155 on sites that have not been planned.

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TABLE III.—Number of families in dwellings of various types.

The total for all types on each project is normally the same as given on Table II. The total of the numbers of families listed in dwellings of various numbers of rooms also equals the total on Table II. Those listed as "undetermined" are on projects where the plot plan indicated a greater number of houses than were actually fixed as to type, or in a few cases where there were a few existing houses within the project.

		Type.						Number of rooms per family.								
No.	Project.	In 1-family houses.			In 2-flat houses.			In apartment houses.	2	3	4	5	6	7	8	Undetermined.
		Detached.	Semidetached.	Row.	Detached.	Semidetached.	Row.									
56	Aberdeen, Md.	65		15							10		70			
181	Alabama nitrate district:															
597	Florence	95				28					72	31	26			16
1165	Sheffield	85				28					60	37				
621	Tuscumbia	52									23	14	5			
	Alliance, Ohio:															
	Northwest	52										25	27			
	Southeast	213										74	55			84
554	Alton, Ill.:															
	Broadway						48						48			
	East Alton	15										8	7			
	Milton Hill	17	82	170				15			66	96	122			
59	Bath, Me.	74				16			16			20	54			
24	Bethlehem, Pa.	32	230	931				65		8	43	21	953		233	
	Bridgeport, Conn.:															
102	Houses—															
	Black Rock (1)							216		18	156	42				
	Connecticut Avenue (14)							108		12	96					
	Crane (4)		6	259		28	84			60	266	51				
	Grasmere (12)	1	40	20	40					8	8	29	56			
	Mill Green (5)	4	34	21		52					8	85	18			
	Mill Green Cemetery Extension		22	20	54							78	11	4		
102a	Temporary Flats—															
	Cemetery Site							212			212					
	Hill Top							188			188					
456	Butler, Pa.	29	138								42	83	42			
565	Charleston, S. C.	136						20			131	15	10			
18	Charleston, W. Va.	47	40								20	20	37		10	
	Chester, Pa.:															
	Eddystone (Sections I and II)		22	490				68		30	174	87				289
1635	Ridley Park		62	481				22		5	17		477	66		
2947	Dayton, Ohio:															
243	Edgemont	175	296	34	122		160			80	96	387	170			54
	Leo Street					40						40				
244a	Elizabeth, N. J.:															
	Site A		50									18	32			
	Site B			104								28	76			
	Site D		50									20	30			
10	Erie, Pa.:															
	East	37	60	88				38		8	68	89	58			
	West	95	172	200				32			164	169	166			
457	Hammond, Ind.	86	36	52							79		70	22		
578	Ibion, N. Y.	90	40				24					14	140			
1314	Indianapolis, Ind.		22										22			
496	Indianhead, Md.	146						44			44		100			46
607	Kemilworth, N. J., site E.		52									22	22			8
	Lowell, Mass., Houses:															
398a	High Street Extension	19	60					4		2	2	28	51			
	Livingston	16	24									6	34			
2972	Lyles (Wrigley), Tenn.	110									56	50	5	1		4
	Colored	15								15						
581	Mare Island (Vallejo), Calif., Houses	231	36			152				64	232	93	30			
381	Milton, Pa.:															
	Hepburn Street	12				12						7	17			
	Site B	54				12					6	2	18			40
997	Muskegon, Mich.:															
	McGraft	248										55	115			78
	Schoenberg	30										10	20			
880	Neville Island, Pa., Coraopolis	32	34	9								22	33			
271	New Brunswick, N. J.	41	150	206							76	138	183			
1371	New Castle, Del.	20	10	16								12	28			6
157	New London, Conn.	15	148									101	62			
	Groton	7	18									25				
722	New Orleans, La.	209									58	31	9			111
382	Newport, R. I.		68									56	12			
	Jamestown	10											10			
	Newport News, Va.:															
57a	Hilton Extension	158	146	161							127	20	279	20		19
57c	Briarfield	150	164	236							392	86	72			
404	Niagara Falls, N. Y.:															
	Site A	45	56	32						16		68	41			8
	Site B	4	46	150							68	68	60			4
	Site C		20	48							24	26	18			
481	Niles, Ohio	103	14								5	66	16			
	Norfolk district:															
150a	Craddock, Va.	801	170	160			104				192	197	783	43	20	
150b	Glenwood Park, Va.	136	374	138							64	222	245	112	5	
150c	Truxton, Va.	293	50									273				
60	Pensacola, Fla.	135									62	12	3			58
471	Perth Amboy, N. J.				4		152				156					
	Philadelphia, Pa.:															
503	Navy Yard, Oregon Ave.															
1536	Tacony			606									689		7	
2125	Pompton Lakes, N. J.		26	242									242		26	
2990	Port Penn, Del. (third site)	15											15			
604	Portsmouth, N. H. (Kittery, Me.)	1,024											1,024			
2728	Portsmouth, Ohio (second site)	16	48									56	8			
141	Puget Sound, Navy Yard (Bremerton), Wash., Inside	192										52	140			

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TABLE III. -Number of families in dwellings of various types. Continued.

No.	Project.	Type.						Number of rooms per family.									
		In 1-family houses.			In 2-flat houses.			In apart- ment houses	2	3	4	5	6	7	8	Under- ter- mined.	
		De- tached.	Semide- tached.	Row.	De- tached.	Semide- tached.	Row.										
62	Quincy, Mass.: Arnold Street.....	250						15	18	69	132	71					5
	Baker Yacht Basin.....	77	50									70	55			2	
	River Street.....		18			218					148	88					
246c	Rock Island district: Davenport, Iowa—	13	46									1	57			1	
	King.....	100	20								30	72	18				
	McManus.....	247	20								47	113	29				78
	Park Lane.....	79	12								21	56	14				
246a	Moline, Ill.....	103	14								58	37	22				
246b	East Moline, Ill.— Deere.....		17	10								23	4				
	Highlands.....		79	20								15	69	15			
246c	Rock Island, Ill.....		183	34								25	151	41			
1368	Seven Pines, Va.....		863											855	6	2	
138	Sharon, Pa.....		199	16							113	65					37
471a	South Amboy (Ernstson), N. J.....		920											882			38
1535	South Bend, Ind.....		186								39	98		49			
2708	Stamford, Conn., Site A.....		25											25			
130	Staten Island, N. Y.: Apartments.....							36		8	24	4					
	Houses.....		78											75			3
1367	Tullytown, Pa.....		129											129			
118	Warren, Ohio: Northeast.....		32	20								36	5				11
	Southeast.....		35	12								22	25				
	Washington, D.C., district: Navy Yard—																
27a	Apartments.....							308		60	42	173			3		
27b	Houses.....		274											274			
54c	Residence Halls—Twenty-first and B Streets.....							336		336							
54f	Bureau of Standards.....							102		54	36	12					
54g	South Capitol Street.....			52			119		16	69	94	8	11				
54h	Steel & Ordnance Co.....		12	38	24							27	47				
380	Waterbury, Conn.: Chase.....		47	22		1				1		28	41				
	Sylvan Avenue.....		68	66		1				1		48	86				
389	Watertown, N. Y.....		226	76								189	111				2
151	Watervliet (Troy), N. Y.....		55	36								30	61				
	Total, 21,983 families.....	9,543	3,996	5,057	440	368	693	1,887	34	970	4,404	4,837	10,143	277	306		1,009

¹ Includes 978 on sites that have not been planned.

TABLE IV.—Data on family dwellings and other buildings illustrated.

"Measurements per family" in the case of buildings for more than one family were found by dividing the total for the building by the number of families.

"Cubical contents" gives the actual cubage, measured to the outside of the walls and roof, including all gables and dormers, and including the cellar to a depth of 3 inches below its floor level. Porches are normally excluded because in most cases they can be varied in size or omitted from the house proper without otherwise altering its service value. However, in a few cases, as noted, enclosed porches which are an integral part of the house have been included.

Plan designation.	Total number of families.	Classification.		Measurements (per family).				Percentages of total area.									
		Type.	Number of stories high.	Number of rooms per family.	Cubical contents, excluding porches (cubic feet).	Area at first story, excluding porches (square feet).	Porch floor area (square feet).	Area of all stories, excluding porches (square feet).	Per cent in walls.	Per cent in closets.	Per cent in halls.	Per cent in kitchen.	Per cent in dining room.	Per cent in living room.	Per cent in bath room.	Per cent in bed rooms.	
STANDARD HOUSE PLANS.																	
A	Detached.....	1	4	18,600	616	60	616	12.5	2.0	3.0	16.5	.....	23.0	5.0	38.0	
B	do.....	1	4	12,660	616	68	616	14.5	2.5	8.0	13.5	.....	20.0	5.0	36.5	
C	do.....	1	4	13,750	672	105	672	13.0	2.0	7.0	27.0	.....	17.0	4.0	30.0	
D	do.....	1	5	10,500	753	72	753	13.5	3.0	2.0	12.5	.....	19.5	5.0	44.5	
E	do.....	1	5	14,900	727	80	727	14.5	2.5	6.0	14.5	12.5	17.5	6.0	26.5	
F	do.....	1	5	15,400	753	90	753	14.7	3.0	5.0	12.8	.....	19.7	4.3	40.5	
G	do.....	1	6	18,740	915	82	915	13.5	2.0	6.0	11.2	12.0	19.0	3.3	33.0	
H	do.....	1	6	11,900	852	80	852	13.5	2.0	5.5	10.0	12.0	16.5	3.5	37.0	
I	do.....	2	4	10,400	360	105	708	16.0	1.0	7.2	17.8	.....	19.7	4.3	34.0	
J	do.....	2	5	9,600	470	81	852	15.5	1.5	11.5	10.5	11.0	19.5	5.0	25.5	
K	do.....	2	5	14,000	580	22	907	16.2	5.3	11.5	12.0	12.5	17.5	2.8	22.2	
L	do.....	2	6	16,240	583	146	1,140	14.9	2.5	13.0	7.2	10.2	18.0	3.2	31.0	
M	do.....	2	6	14,250	534	73	1,038	15.0	1.5	13.0	10.2	11.3	13.7	3.0	32.3	
N	do.....	2	6	15,000	529	92	1,057	11.2	3.0	14.2	10.0	11.3	15.0	3.5	31.8	
O	do.....	2	6	12,500	493	75	976	14.1	2.1	9.1	9.7	11.2	19.7	4.1	30.0	
P	do.....	2	7	17,950	578	84	1,238	15.0	3.0	9.7	9.5	11.2	13.8	3.5	34.3	
Q	Semidetached.....	2	6	14,275	505	.....	875	15.0	2.5	11.0	8.0	11.5	19.5	4.0	28.5	
R	do.....	2	4	10,550	412	.....	785	15.0	1.5	12.0	18.0	.....	20.0	3.5	30.0	
S	do.....	2	6	15,295	518	80	1,036	15.0	2.5	14.2	10.0	11.0	12.8	4.0	30.5	
T 1	Row.....	2	4	8,650	284	.....	567	18.0	2.3	10.2	18.2	.....	17.5	4.8	29.0	
T 2	do.....	2	4	8,650	284	.....	567	16.7	1.5	10.0	18.5	.....	19.0	4.5	29.0	
U	do.....	2	6	17,370	587	.....	1,147	15.5	3.0	12.5	8.5	11.5	15.0	3.5	30.5	
V	Row end.....	2	7	20,340	644	66	1,267	15.0	2.5	14.2	6.8	11.5	15.5	2.5	32.0	
W	Detached 2-flat.....	2	5	14,635	504	117	986	14.1	2.5	11.3	10.2	13.9	18.2	4.2	25.6	
X	Semidetached 2-flat.....	2	4	11,565	473	.....	943	13.5	2.9	15.8	15.1	.....	19.7	4.0	29.0	

ABERDEEN, MD.

B	6	Detached.....	2	6	15,318	549	40	1,055	14.5	3.0	10.6	8.7	10.6	18.7	4.7	29.2
C	10	do.....	2	6	14,916	528	40	1,056	14.5	4.0	9.7	8.4	11.3	17.4	4.0	30.7
D	15	Row (converted).....	2	4-5	11,918	407	106	833	14.8	2.2	9.6	17.8	.....	19.0	4.5	32.1
E	18	Detached.....	2	6	14,432	528	45	1,056	14.8	3.8	9.8	8.4	11.3	17.4	4.0	30.5

ALABAMA NITRATE DISTRICT.

4 a	56	Detached.....	1	4	112,365	710	131	710	14.8	3.3	3.1	15.7	.....	25.3	4.8	33.0
4 b	43	do.....	1	4	112,200	716	100	716	15.1	3.8	6.2	11.5	.....	23.1	4.4	32.9
5 a	28	do.....	1	5	115,105	910	104	910	14.8	4.5	7.2	12.2	.....	18.9	4.3	38.1
5 b	39	do.....	1	5	114,270	857	104	857	15.0	3.4	5.6	11.7	14.4	20.9	3.8	25.2
16 a	28	Semidetached 2-flat.....	2	4	12,560	400	112	784	17.3	5.0	13.3	11.5	.....	19.3	4.4	29.2

ALTON, ILL.

1-5	6	Detached.....	2	5	10,470	477	92	911	15.8	0.6	10.8	9.5	10.6	18.8	4.8	29.1
1-5-A 12	9	do.....	2	5	12,947	485	64	907	15.4	3.9	10.4	11.6	11.2	18.6	3.6	25.3
1-6	2	do.....	2	6	15,166	613	88	1,000	15.4	2.8	6.7	11.2	13.2	14.0	3.2	33.5
2-5-A 18	36	Semidetached.....	2	5	11,620	462	74	892	14.7	3.0	8.8	10.4	12.2	18.8	5.9	26.2
4-6-A 1	132	Row.....	2	6	15,290	506	110	1,052	15.1	5.0	13.2	9.0	12.7	13.6	3.7	27.7
6-4-A 14	30	do.....	2	4	9,940	331	57	663	16.0	2.0	13.0	19.8	.....	16.0	4.0	29.2

BATH, ME.

A	31	Detached.....	2	6	16,048	544	121	1,088	15.8	2.4	15.1	8.2	9.5	15.0	3.5	30.5
B	23	do.....	2	6	14,592	512	52	1,024	15.0	2.9	14.7	8.3	11.0	13.4	4.6	30.1
C	20	do.....	2	5	13,124	514	86	457	14.7	4.7	11.2	8.9	12.5	15.8	4.2	28.0
D	16	Semidetached 2-flat.....	2	3	9,531	305	62	584	15.3	3.8	14.6	15.9	.....	24.9	6.5	19.0

BETHLEHEM, PA.

A 1	130	Row end.....	2	6	17,700	536	142	1,072	19.0	2.1	12.7	9.0	11.1	12.3	4.1	29.7
D 1	364	do.....	2	6	16,800	543	182	1,086	17.6	1.5	12.1	9.2	12.8	13.4	3.7	29.7
E 2	195	Row.....	2	6	18,300	586	228	1,172	17.3	2.2	14.4	10.2	12.0	11.7	3.2	29.0
R 1	149	Row end.....	2½	8	20,240	572	185	1,716	19.6	4.8	14.5	6.3	8.3	8.4	4.5	30.6

¹ No cellar.

² Includes pantry.

³ Includes enclosed porches.

⁴ Includes attic storage space, 5.9 per cent.

REPORT UNITED STATES HOUSING CORPORATION.

TABLE IV.—Data of family dwellings and other buildings illustrated—Continued.

Plan designation.	Total number of families.	Classification.		Measurements (per family).					Percentages of total area.							
		Type.	Number of stories high.	Number of rooms per family.	Cubical contents, excluding porches (cubic feet).	Area at first story, excluding porches (square feet).	Porch floor area (square feet).	Area of all stories, excluding porches (square feet).	Per cent in walls.	Per cent in closets.	Per cent in halls.	Per cent in kitchen.	Per cent in dining room.	Per cent in living room.	Per cent in bath room.	Per cent in bed rooms.
BRIDGEPORT, CONN.																
G 1	30	6-family apartment.....	3	3	8,299	226	59	678	21.0	1.7	15.7	15.8		22.6	5.6	17.6
G 2	252	12-family apartment.....	3	4	10,900	294	20	878	19.8	3.0	13.5	12.6		19.3	4.3	27.5
G 3	42	.....do.....	3	5	12,098	328	26	985	19.0	2.8	13.7	14.0	12.0	13.2	3.7	21.6
H 2	6	Detached 2-flat.....	2	5	14,570	536	202	1,072	17.7	3.0	10.9	9.8	11.8	16.1	4.3	26.4
H 6	20	Semidetached 2-flat.....	2	4	11,572	428	15	856	18.9	3.1	16.5	17.1			4.4	40.0
K 9	4	Semidetached.....	2	4	10,678	443	21	493	18.5	4.1	10.8	19.2		13.0	4.2	30.2
H 5-5-6	84	Row 2-flat.....	2	3-4	10,222	380	17	761	19.5	3.2	17.5	19.8			5.5	34.5
K 8-10-8-10-12	5	Row.....	2	4	12,060	456	30	898	19.8	4.0	16.0	18.2		6.2	4.0	31.8
K 9-8-10-12-12-8-10	7	.....do.....	2	4	12,060	462	27	860	19.0	3.9	14.7	17.7		10.5	3.8	30.4
CHARLESTON, W. VA.																
A	20	Semidetached.....	2	4	8,908	364	116	727	18.1	1.4	10.9	18.2		18.2	4.5	28.7
B	20	.....do.....	2	5	14,986	486	32	1,075	17.6	5.5	7.2	14.7		17.5	3.9	33.6
D	12	Detached.....	2	6	13,000	564	160	1,128	18.1	4.4	6.0	8.0	10.8	19.9	3.8	29.0
E	8	.....do.....	2	6	15,360	563	120	1,179	20.8	3.7	10.5	8.9	9.6	12.7	3.4	30.4
G	5	.....do.....	2	8	20,550	765	207	1,530	17.6	3.0	10.0	11.1		11.1	3.7	43.5
CHESTER—EDDYSTONE, PA.																
A	101	Row, inside.....	2	4	13,770	448	86	896	17.1	2.4	10.3	18.5		18.5	4.2	29.0
B	23	.....do.....	2	5	16,238	480	85	960	17.8	2.1	11.2	17.2		20.3	3.4	28.0
D	31	Row, end.....	2	5	16,043	495	135	1,061	19.3	2.5	10.6	15.5		18.3	3.6	30.2
E	9	.....do.....	2	5	15,623	495	117	1,005	19.8	2.2	10.8	16.3		19.3	3.6	28.0
CHESTER—RIDLEY PARK, PA.																
C	66	Row inside.....	2	8	16,860	525	100	1,406	18.7	3.1	10.6	5.6	8.3	12.3	2.3	39.1
F	52	Row end.....	2	6	16,700	540	90	1,080	19.7	2.4	8.5	8.8	10.7	19.2	3.2	27.5
G	4	.....do.....	2	6	16,670	548	140	1,086	19.5	2.1	8.7	8.2	11.5	18.2	3.6	28.2
H	9	Row inside.....	2	6	16,250	525	90	1,050	18.5	3.4	10.1	9.1	10.9	16.4	3.2	28.1
DAYTON, OHIO.																
AA	36	Semidetached.....	2	6	15,920	445	56	1,022	16.4	4.9	12.9	7.3	10.5	14.9	3.8	29.3
B	26	Detached.....	2	6	15,770	546	123	1,092	15.0	2.5	11.0	8.1	14.3	15.4	3.6	30.2
D	26	.....do.....	2	5	13,988	476	45	952	15.7	3.3	10.0	9.5	13.3	13.3	4.5	30.4
EE	88	Semidetached.....	2	5	13,360	468	44	906	16.3	3.2	11.0	8.7	11.7	15.8	3.7	29.6
H 8	16	Row.....	2	4	11,442	410	40	794	16.2	2.9	11.4	19.3		17.8	4.5	27.9
X 12	48	Row 2-flat.....	2	4	10,735	360	36	2,736	14.8	3.3	9.2	13.1		23.0	5.0	231.6
Y 12	48	.....do.....	2	3	9,390	324	36	2,690	15.6	2.3	8.9	16.5		22.1	5.8	228.8
ERIE, PA.																
101-B	5	Detached.....	2	5	15,888	581	110	1,156	17.5	3.8	12.4	8.2	11.6	15.0	6.1	25.4
102-B	17	.....do.....	2	6	18,644	630	102	1,200	17.5	3.0	8.2	8.7	12.3	17.7	3.8	28.8
103-B	10	.....do.....	2	6	17,648	544	120	1,088	17.9	2.7	12.6	8.3	12.0	14.1	3.7	28.7
201-B	12	Semidetached.....	2	5	13,855	604	122	1,170	16.9	4.9	13.3	7.7	12.0	15.4	3.9	25.9
202-P	20	.....do.....	2	5	15,090	542	88	1,080	15.5	2.2	9.5	10.3	12.2	17.0	3.7	29.6
203-B	12	.....do.....	2	6	18,932	612	136	1,224	15.5	4.0	8.5	8.6	10.8	20.3	3.3	29.0
204-B	16	.....do.....	2	6	17,316	590	112	1,166	16.4	3.0	13.0	8.6	10.9	14.1	3.7	30.3
301-B	12	Row.....	2	5-6	17,292	688	92	1,180	17.2	3.4	12.7	8.7	12.0	15.8	4.0	26.2
402-B	24	.....do.....	2	5	16,230	538	88	1,075	14.7	3.1	9.3	10.3	12.3	16.4	3.8	30.1
ILION, N. Y.																
B 1-2-3	60	Detached.....	2	6	14,094	485	94	1,001	15.0	2.5	10.6	9.7	11.2	14.2	3.6	33.2
C 2	14	Semidetached.....	2	6	15,615	500	105	1,022	13.2	2.7	7.2	8.6	10.9	16.4	3.2	37.8
D 1	24	Row.....	2	6	17,706	508	135	1,160	13.4	2.3	13.0	7.3	11.0	17.8	4.4	30.8
E 1	14	Semidetached.....	2	5	13,864	484	65	955	15.2	4.0	13.2	9.7	11.5	13.8	4.4	28.2
INDIANHEAD, MD.																
A 1	6	Detached.....	2	6	11,100	480	125	985	15.6	1.9	8.3	12.9	13.5	13.6	3.7	30.5
A 8	7	.....do.....	2	6	11,720	480	102	985	14.9	1.7	8.2	12.6	13.4	14.3	3.6	31.3
B 1	10	.....do.....	2	6	10,920	520	200	1,040	15.7	6.0	8.4	10.1	12.0	14.5	4.1	29.2

¹ Includes pantry.² Includes area of inclosed porches, 3.6 per cent.³ Includes area of inclosed porches, 7.45 per cent.

TABLE IV.—Data on family dwellings and other buildings illustrated—Continued.

Plan designa- tion.	Total num- ber of fam- ilies.	Classification.		Measurements (per family).					Percentages of total area.							
		Type.	Num- ber of stories high.	Num- ber of rooms per family.	Cubical contents, exclud- ing porches (cubic feet).	Area at first story, ex- cluding porches (square feet).	Porch floor area (square feet).	Area of all sto- ries, ex- cluding porches (square feet).	Per cent in walls.	Per cent in closets.	Per cent in halls.	Per cent in kitch- en.	Per cent in dining room.	Per cent in living room.	Per cent in bath room.	Per cent in bed rooms.
LOWELL, MASS.																
B	4	Detached.....	2	6	14,000	487	96	1,043	14.3	2.4	10.4	8.3	10.5	17.2	4.8	32.1
C	5	do.....	2	6	14,796	525	83	1,042	15.1	2.1	10.1	10.0	13.4	14.6	4.2	30.5
E	8	Semidetached.....	2	6	14,343	512	72	1,002	16.3	3.2	15.1	8.9	10.8	12.9	4.0	28.8
F	30	do.....	2	6	14,800	500	85	1,040	15.6	2.3	12.5	9.0	10.8	13.5	3.6	32.7
J	14	do.....	2	5	13,035	508	60	936	15.8	3.2	11.0	10.9	12.3	15.4	4.8	26.6
Q	5	Detached.....	2	6	15,180	502	80	1,046	16.4	2.1	12.3	9.1	10.8	13.0	3.7	32.6
MARE ISLAND, CALIF.																
B	40	Semidetached 2-flat.....	2	3	9,650	372	30	744	14.2	7.1	21.1	18.1	.....	24.1	.....	15.4
C	24	Semidetached.....	2	5	13,740	522	85	1,082	14.7	3.8	13.8	15.2	.....	17.2	4.0	31.3
D	30	Detached.....	2	6	13,085	544	88	1,066	15.7	2.7	12.7	9.1	.....	19.2	3.4	37.2
F	83	do.....	2	4	11,644	473	50	946	16.0	3.5	14.6	15.6	.....	18.6	3.5	28.2
NEW BRUNSWICK, N. J.																
1-6 and 1-6 R	11	Detached.....	2	6	15,164	536	103	1,046	18.8	2.7	10.3	9.0	10.3	17.1	3.3	28.2
2-5 A and B	84	Semidetached.....	2	5	14,363	464	100	902	18.1	2.8	10.4	10.3	10.8	16.2	3.8	27.6
2-5-6	6	do.....	2	5-6	13,919	495	101	904	16.7	3.3	9.7	9.7	10.4	17.1	3.6	29.5
2-6 A and B	54	do.....	2	6	13,970	525	92	1,024	17.7	3.4	9.4	9.1	10.5	18.0	3.3	28.6
6-4	36	Row.....	2	4	11,360	395	78	772	21.5	4.1	13.2	17.5	.....	13.1	4.1	26.5
6-6	42	do.....	2	6	15,738	518	86	1,010	16.5	3.1	11.0	9.4	10.8	17.7	3.5	28.0
8-4	40	do.....	2	4	11,344	393	77	767	21.5	4.3	13.0	17.4	.....	13.5	4.1	26.2
8-5	18	do.....	2	5	13,225	454	86	887	16.6	3.0	11.2	10.3	11.6	14.1	3.9	29.3
8-6	40	do.....	2	6	14,843	520	82	1,012	16.4	3.0	10.9	7.9	10.6	16.9	3.4	30.9
NEW LONDON, CONN.																
A	9	Detached.....	2	5	13,000	480	64	960	15.8	3.3	11.0	8.9	12.6	15.8	4.0	28.6
A-2	4	do.....	2	5	13,180	480	150	984	15.9	3.3	10.7	8.1	12.0	15.5	3.8	30.7
A-3	9	do.....	2	5	13,100	480	75	900	15.7	3.4	11.1	8.7	12.5	15.7	4.0	28.9
B-1-A	94	Semidetached.....	2	5	13,370	484	60	944	15.9	4.5	15.6	8.3	11.7	13.3	4.0	26.7
B-4	8	do.....	2	5-6	14,175	515	104	1,018	13.5	3.3	9.7	8.7	12.9	17.7	4.7	29.5
NEWPORT, R. I.																
A	12	Semidetached.....	2	6	15,280	549	24	1,064	14.2	2.2	12.2	10.5	11.9	13.3	5.1	30.6
B-1	36	do.....	2	5	11,075	470	95	907	14.8	2.5	7.8	11.9	12.1	15.9	4.5	30.5
C-1	10	Detached.....	2	6	14,900	493	50	1,035	16.0	2.4	9.2	8.0	10.9	15.5	4.4	33.6
NILES, OHIO.																
5	9	Detached.....	2	5	12,600	458	70	916	15.5	2.8	11.2	8.1	12.1	15.8	4.7	29.8
7	8	do.....	2	6	15,300	505	48	1,057	15.5	4.3	12.3	7.6	12.1	13.8	4.7	29.7
12	14	Semidetached.....	2	5	12,694	448	88	895	15.3	3.1	11.3	8.4	12.3	15.7	4.0	29.9
NORFOLK DISTRICT—CRADOCK, VA.																
B-2	11	Detached.....	2	5	10,740	483	177	953	15.8	3.8	10.8	11.7	9.5	15.1	4.3	29.0
B-4	10	do.....	2	5	11,490	485	199	970	15.8	3.7	9.8	17.8	.....	20.5	3.3	29.1
C-1	25	do.....	2	6	12,180	555	187	1,097	16.1	3.0	10.4	10.0	9.8	19.4	3.4	27.9
C-8	37	do.....	2	6	12,580	555	123	1,097	16.4	4.7	10.0	10.6	9.8	14.8	3.2	30.5
D-4	2	do.....	2	7	14,717	618	125	1,266	15.6	3.0	10.2	10.9	9.7	14.1	2.9	33.6
F-3	2	Semidetached.....	2	4	8,800	360	115	715	17.4	1.7	10.3	20.0	.....	19.3	4.4	26.9
G-2	12	do.....	2	5	11,100	530	182	941	15.9	1.5	11.8	13.7	11.0	15.3	4.1	26.7
G-4	12	do.....	2	5	11,115	498	134	921	15.5	2.6	8.2	9.4	12.0	16.9	4.4	31.0
J-6	12	Row.....	2	6	12,250	506	144	999	14.3	2.8	9.1	9.4	11.8	18.8	2.8	31.0
PHILADELPHIA—TACONY, PA.																
A-3	78	Row.....	2	6	13,350	472	70	944	19.9	2.3	6.8	7.9	11.9	17.7	3.6	29.9
D-1	116	do.....	2	6	13,050	462	90	924	17.6	2.4	7.0	8.1	12.3	18.3	3.6	30.7
F-3	26	Semidetached.....	2½	8	19,290	565	114	1,543	20.1	5.4	9.9	4.9	9.3	14.0	2.8	33.6

1 Includes summer kitchen.

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TABLE IV.—Data on family dwellings and other buildings illustrated—Continued.

		Classification.		Measurements (per family).						Percentages of total area.							
Plan designation.	Total number of families.	Type.	Number of stories high.	Number of rooms per family.	Cubical contents, excluding porches (cubic feet).	Area at first story, excluding porches (square feet).	Porch floor area (square feet).	Area of all stories, excluding porches (square feet).	Per cent in walls.	Per cent in closets.	Per cent in halls.	Per cent in kitchen.	Per cent in dining room.	Per cent in living room.	Per cent in bath room.	Per cent in bed rooms.	
PORTSMOUTH, N. H.																	
A	8	Semidetached.....	2	6	15,925	534	44	1,092	14.7	3.4	9.1	13.3	9.5	13.3	3.8	32.9	
B	40	do.....	2	5	15,155	513	42	1,003	15.5	3.4	8.3	13.6	10.4	14.0	3.8	29.6	
C	16	Detached.....	2	5	14,276	520	51	935	16.2	2.7	10.8	14.6	10.9	15.5	4.8	24.5	
QUINCY, MASS.																	
A-5-A	28	Detached.....	2	5	13,286	496	192	966	16.0	1.9	13.5	9.2	11.9	14.2	4.3	29.0	
A-5-B	21	do.....	2	5	13,931	532	96	1,022	16.2	5.1	12.6	11.3	10.8	14.4	3.8	25.8	
A-6-A	22	do.....	2	6	15,366	623	75	1,062	15.7	2.5	9.1	9.6	10.5	14.2	3.2	35.2	
A-6-C	4	do.....	2	6	11,720	543	82	1,050	15.8	2.3	12.1	10.7	10.3	14.6	3.6	30.6	
A-8-A	3	do.....	2	8	17,400	634	134	1,268	14.2	2.1	11.5	7.7	9.4	12.0	2.9	40.2	
B-5-A	21	Semidetached.....	2	5	12,330	471	87	942	15.8	3.1	14.8	17.4	.....	14.2	4.3	30.4
B-6-A	28	do.....	2	6	16,580	516	94	1,106	16.9	2.6	11.7	10.2	10.5	12.3	3.2	32.6	
B-6-B	36	do.....	2	6	14,315	546	90	1,092	17.0	2.0	15.2	9.1	10.2	13.7	3.8	29.0	
F-5-A	48	Detached 2-flat.....	2	5	13,462	476	118	952	14.0	2.7	11.0	12.1	13.4	17.8	4.4	24.6	
ROCK ISLAND DISTRICT—DAVENPORT, IOWA.																	
550-4	11	Detached.....	1	4	13,950	698	94	698	14.3	2.8	8.3	17.0	.....	22.2	6.2	29.2
552-2	30	do.....	1	5	15,275	783	86	783	14.7	2.3	7.3	10.4	16.6	16.6	4.4	27.7	
553-3	12	do.....	1	5	16,125	698	70	698	14.9	4.1	9.1	10.2	14.1	15.1	4.6	27.9	
554-1	18	do.....	2	5	11,929	480	71	925	15.2	2.5	10.9	7.9	12.9	17.6	4.3	28.7	
554-6	23	do.....	2	5	11,955	472	72	910	15.9	2.5	9.8	7.8	12.8	18.0	4.3	28.9	
556-3R	15	do.....	2	5	14,473	508	78	1,016	15.4	3.2	10.5	6.8	11.4	18.4	4.2	30.1	
ROCK ISLAND DISTRICT—MOLINE, ILL.																	
C-1	42	Detached.....	1	4	14,780	716	106	716	14.5	3.1	6.7	12.8	.....	21.8	6.1	35.0
H-2-1	26	do.....	2	5	13,035	520	84	1,000	14.9	2.4	9.8	7.3	11.0	21.5	3.5	29.6	
STATEN ISLAND, N. Y.																	
A	16	Semidetached.....	2	6	13,650	517	80	1,017	14.4	3.8	12.1	7.9	12.7	14.7	4.2	30.2	
	37	37-family apartment.....	4	3-4-5	7,840	184	.....	943	18.5	19.7	8.2	11.8	.....	16.9	4.5	20.4
WASHINGTON, D. C.—SOUTH CAPITOL STREET.																	
A	16	Row 2-flat.....	2	2	3,875	197	45	395	18.3	3.2	8.9	25.0	.....	.....	10.6	34.0
B	56	do.....	2	3	5,500	232	56	564	18.7	4.2	13.4	17.2	.....	21.2	5.3	17.0
C	56	do.....	2	4	7,200	370	60	740	18.1	5.0	10.0	15.6	.....	20.8	5.0	25.5
D	22	Row.....	2	4	7,900	395	38	790	17.2	3.3	8.6	20.9	.....	17.2	4.6	28.2
E	8	do.....	2	4	7,750	395	38	790	17.1	3.5	8.1	20.9	.....	17.0	5.5	27.9
F	14	do.....	2	6	8,700	445	70	890	17.1	2.6	6.6	6.9	12.6	20.7	3.5	30.0	
G	8	Row end 2-flat.....	2	3	5,200	200	65	520	19.8	1.7	11.3	14.9	.....	25.0	7.6	19.7
L	8	Row.....	2	4	8,600	409	43	861	22.0	2.9	8.5	17.3	.....	16.3	3.5	29.5
WASHINGTON, D. C.—NAVY YARD.																	
B	60	3-family apartment.....	3	5	16,267	348	147	1,043	24.6	2.9	13.1	10.5	.....	15.5	3.4	30.0
C	59	do.....	3	4-5	13,333	297	112	800	21.1	2.7	11.6	12.7	.....	17.7	3.7	30.5
E	36	do.....	3	4-5	13,508	305	88	914	20.6	2.6	11.4	12.3	.....	17.3	3.6	32.2
G	45	do.....	3	3	10,133	202	102	605	24.3	4.0	.....	18.1	.....	26.3	5.9	21.4
WATERBURY, CONN.																	
A	85	Detached.....	2	6	15,980	514	84	1,074	15.4	5.4	15.2	9.2	11.3	11.3	3.2	29.0	
A-3	42	Semidetached.....	2	6	15,850	511	85	1,033	15.1	4.7	16.2	9.2	11.5	11.5	3.3	28.5	
B-2	46	do.....	2	5	12,805	390	76	856	14.9	1.8	14.5	16.8	.....	14.4	4.5	33.1
WATERTOWN, N. Y.																	
1	28	Detached.....	2	5	12,765	480	120	960	15.5	6.1	14.3	10.4	9.8	14.0	3.5	26.4	
1-1R	18	Semidetached.....	2	5	13,150	480	118	960	14.2	5.4	15.3	10.9	10.4	12.8	4.4	26.6	
2	32	Detached.....	2	5	13,000	480	168	960	15.6	2.6	13.4	7.4	10.5	15.2	5.5	29.8	
3	19	do.....	2	6	14,900	545	115	1,090	15.2	2.4	14.6	8.1	10.4	15.3	3.8	30.2	
4	18	do.....	2	6	14,700	545	98	1,090	15.3	2.3	13.4	9.1	10.3	14.1	4.1	31.4	
5	16	do.....	2	6	14,510	532	120	1,064	15.6	2.7	13.7	7.9	10.6	15.0	4.5	30.0	
5,160		Averages of 178 plans.	.....	.....	11,544.2	505.2	89.6	953.6	16.34	3.19	10.84	11.68	7.72	16.37	4.10	29.76

¹ Includes storage area, 17.3 per cent.² Includes porches and fire stairs.³ Average for 120 plans containing dining rooms, 11.45 per cent.

TABLE I V.—Data on family dwellings and other buildings illustrated—Continued.

SPECIAL BUILDINGS.

Indianhead, Md.—Dormitory, 2 stories, 33 bed rooms:	
Cubical contents (excluding porches).....	69,756 cu. ft.
Area at first story (excluding porches).....	2,632 sq. ft.
Porch floor area.....	276 sq. ft.
Area of all stories (excluding porches).....	5,264 sq. ft.
Percentages of total area in—	
Walls.....	12.90
Closets.....	.90
Halls.....	17.75
Toilets.....	7.05
Common rooms.....	6.65
Bedrooms.....	54.75
	100.00
Indianhead, Md.—Schoolhouse, 1 story, 8 class rooms and auditorium:	
Cubical contents (excluding porches).....	354,925 cu. ft.
Area at first story (excluding porches).....	13,623 sq. ft.
Porch floor area.....	827 sq. ft.
Percentages of total area in—	
Walls.....	6.68
Vents.....	.98
Corridors.....	19.40
Closets.....	.75
Toilet rooms.....	4.18
Cloakrooms.....	7.00
Classrooms.....	30.50
Auditorium.....	18.70
Stage.....	1.86
Anteroom.....	.95
	100.00
New Brunswick, N. J.—Composite building, 3 stories, 9 apartments, 4 rooms each, stores, lodge rooms, and 1-story moving-picture theater	
Cubical contents (excluding porches).....	217,000 cu. ft.
Cubical contents of theater portion.....	60,000 cu. ft.
Cubical contents of stores and apartments.....	187,000 cu. ft.
Area at first story (excluding porches).....	7,393 sq. ft.
Area of theater portion.....	2,800 sq. ft.
Area of store and apartment portion.....	4,593 sq. ft.
Total area of all stories, excluding theater and porches.....	12,626 sq. ft.
Percentages of total area in—	
Walls.....	14.80
Arcade.....	2.85
Assembly room.....	12.30
Stores.....	21.10
Halls.....	11.65
Closets.....	2.60
Kitchens.....	7.60
Living rooms.....	8.70
Bathrooms.....	2.55
Bedrooms.....	15.85
	100.00
Washington, D. C., South Capitol Street.—Plan II, row end building, 2 stories, 1 store and 3-room flat.	
Cubical contents (excluding porches).....	10,400 cu. ft.
Area at first story (excluding porches).....	520 sq. ft.
Porch floor area.....	34 sq. ft.
Area of all stories (excluding porches).....	1,040 sq. ft.
Percentages of total area in—	
Walls.....	17.10
Closets.....	4.50
Hall.....	7.00
Kitchen.....	8.55
Bathroom.....	4.45
Bedrooms.....	22.60
Store.....	35.80
	100.00
Waterbury, Conn.—Type E, detached building, 2 stories, 1 store and 4-room flat:	
Cubical contents.....	17,193 cu. ft.
Area at first floor (excluding porches).....	540 sq. ft.
Porch floor area.....	112 sq. ft.
Total floor area, exclusive of piazza.....	1,145 sq. ft.
Percentages of total area in—	
Walls.....	12.60
Closet.....	6.80
Hall.....	11.20
Kitchen.....	14.70
Bathroom.....	3.30
Bedroom.....	29.00
Store.....	21.80
	100.00



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TABLE V.—Buildings for individuals and community buildings.

(Only those buildings actually planned for within the area of the project are included.)

No.	Project.	Boarding houses.		Dormitories.		Hotels.		Cafeterias.	Recreation buildings.	Y. M. C. A., K. of C., etc.	Y. W. C. A., etc.
		Num- ber.	Number of lodgers.	Num- ber.	Number of lodgers.	Num- ber.	Number of lodgers.				
56	Aberdeen, Md.			15	60						
554	Alton, Ill.: Broadway. Milton Hill.			112 21	273 486						
24	Bethlehem, Pa.								1		
3480	Buchanan, Mich.			1	100				1		
565	Charleston, S. C.			1	30						
1635	Chester, Pa.: Eddystone.			6	608						
564	Cleveland (Wickliffe), Ohio.			1	124			1			
457	Hammond, Ind.	111	78					1			
578	Ilion, N. Y.	18	168								
1314	Indianapolis, Ind.			11	198				1		
496	Indianhead, Md.			17	1,400						
607	Kenilworth, N. J.: Site C. Site D.			3	78						
3485	Kings Mills (Cincinnati), Ohio.			1	26						
398	Lowell, Mass.: Dormitories— B. & M. R. R. Site High school Site			5 3 4	500 170 202						
2972	Lyles (Wrigley), Tenn.	1	40					1			
581	Mare Island (Vallejo), Calif.: Dormitories.			10	400			1			
381	Milton, Pa.: Dormitories.			6	636			1			
271	New Brunswick, N. J.			5	300			1			
1371	New Castle, Del.			20	530			1			
722	New Orleans, La.							1	1		
57b	Newport News, Va.: Dormitories.			6	1,092				1		
404	Niagara Falls, N. Y.: Site A. Site B. Site C.							1			
	Norfolk district: Craddock, Va. Truxtun, Va.	16 13	72 36								
150a	Paulsboro, N. J.			4	2,000	1	36		1	1	
150c	Penniman, Va.			3	300			1	1		
3706	Pensacola, Fla.			5	475			1			
840	Phillipsburg, N. J.			1	50				1		
60	Pompton Lakes, N. J.			5	475						
588	Port Penn, Del. (third site)			20	593						
2125	Portsmouth, N. H. (Kittery, Me.)			18	2,025			4	1	2	1
2990	Puget Sound Navy Yard (Bremerton), Wash.: Inside			2	150			1			
62a	Quincy, Mass.: Dormitories					1	350				
1368	Seven Pines, Va.			21	966			1	1		
471a	South Amboy (Ernst), N. J.			32	3,230	1	60	3	1	1	1
2708	Stamford, Conn.: Site A.	1	50	23	2,220			2	3	1	2
1367	Tullytown, Pa.			2	100			1			
	Washington, D. C., district: Navy Yard - Dormitories Residence Halls— Station Site. Capitol Site. Twenty-first and B Streets. Bureau of Standards. South Capitol Street. Steel & Ordnance Co.			6 14 12 12 20 2	600 540 972 972 1,622 181			2 1 1 1 1 1		1 1 1 1 1 1	1 1 1 1 1 1
27c	Watertown, N. Y.	14	168								
54a	Watervliet (Troy), N. Y.			5	205						
54c	Woodbury, N. J.			1	150						
54f				15	930			1			1
54g											
549											
389											
151											
1366											
Total, 473 buildings.		34	612	373	26,886	3	416	31	20	6	6

¹ Convertible.² Includes cafeteria.³ Includes 14 convertible.⁴ Includes 15 convertible.

TABLE VI.—*Auxiliary buildings.*

Only those buildings actually planned for within the area of the project are included.

No.	Project.	Theaters	Churches.	Libra- ries.	Schools.	Hos- pitals.	Stores.	Ware- houses.	Garages.	Rail- road sta- tions.	Power houses.	Fire sta- tions.	Post offices.	Miscellaneous buildings.
554	Alton, Ill.: Milton Hall.						18					1		1 waiting room.
24	Bethlehem, Pa.	1	5	1	1		25	1	8			1		
565	Charleston, S. C.						7							
	Chester, Pa.:													
1635	Eddystone.		1	1	1		1				1	1		1 telephone building.
2947	Ridley Park.		1		1		15		1					
10	Eric, Pa.:													
	East.						6							
	West.						8							
496	Indianhead, Md.				1									
398a	Lowell, Mass.: Houses													
	High Street Extension.						3							
2972	Lyles (Wingley), Tenn.				1	1						1		
271	New Brunswick, N. J.	1			1		8							
1371	New Castle, Del.	1					2				1			
733	New Orleans, La.		1		1									
	Newport News, Va.													
57a	Hilton Extension.				1									
57b	Dormitories.													1 laundry.
57c	Briarfield.	1	1		1		38							1 ice plant.
	Norfolk district:													
150a	Craddock, Va.	1	2		2	1	68		2	1	1	1		1 ice plant.
150b	Glenwood Park, Va.	1	1											
150c	Truxtun, Va.	1	1		1		35		1					
60	Pensacola, Fla.		2											
	Philadelphia, Pa.:													
503	Navy yard, Oregon Avenue.						14							
2990	Port Penn, Del. (third site).				1	1								
62a	Quincy, Mass.: Dormitories.										1			
1368	Seven Pines, Va.	1	1		1	1			5	1			1	1 bank, 1 drug store.
471a	South Amboy (Ernstson), N. J.		1		1	1	4			1				1 Q. M. office, 1 vil- lage commissary.
1367	Tullytown, Pa.				1									
	Washington, D. C., district:													
	Navy Yard—													
27a	Apartment.								1					
	Residence Halls—													
54a	Station Site.					1		1			1			
54b	Capitol Site.					1								
54c	Twenty-first and B Streets.					1								
380	Waterbury, Conn.:													
	Chase.				1		1							
	Sylvan Avenue.						1							
	Total, 395 buildings.	8	17	2	18	8	254	2	63	3	5	5	1	9

¹ 1 for 400 pupils.² Serves 54a, c, f, and g.³ Serves Station Site and Capitol Site.

TABLE VII.—General improvements directly chargeable

Unit costs are assumed for comparison only. See remarks introductory to these tables. "Clearing" is put down at actual or estimated cost, as this item varies too much for a unit cost to be significant. Land drainage is not separately itemized, as in the Housing Corporation's projects only ditching, included under "Heavy grading", and storm drains were resorted to.

The unit cost for development of public grounds contemplates simply the initial development of putting in a few paths, lawns, and simple plantings.

No.	Project.	Clearing.	Heavy grading	Storm drains.	Combined sewers.	Inlets.	Manholes	Sanitary sewers.			Public grounds develop- ment.
								8 inches.	Over 8 inches.	Manholes.	
	Unit cost	Acres.	Cubic yards	Linear feet.	Linear feet			Linear feet.	Linear feet		Acres
56	Aberdeen, Md.: Quantity Cost Cost per family	0 1,725 \$1,725.00 \$21.56	1,725 943 \$3,300.50 \$41.25	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.25	3 3 \$120.00 \$1.50	3,408 0 \$3,408.00 \$42.60	0 0 \$600.00 \$7.50	15 0 \$600.00 \$7.50	.56 \$21.00 \$335.00 \$4.20	
185	Alabama nitrate district: Florence— Quantity Cost Cost per family	19.0 \$3,000.00 \$24.39	22,250 \$22,250.00 \$180.09	0 0 \$17,255.00 \$140.28	11 11 \$220.00 \$1.79	18 18 \$720.00 \$5.85	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	.04 \$21.00 \$294.00 \$2.58	
597	Sheffield— Quantity Cost Cost per family	0 \$270.00 \$2.19	26,527 \$26,527.00 \$232.69	1,995 \$6,982.50 \$61.79	0 0 \$360.00 \$3.19	4 4 \$160.00 \$1.42	6,482 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	22 0 \$880.00 \$7.79	.49 \$294.00 \$2.58	
1165	Tusculum— Quantity Cost Cost per family	0 \$4,150.00 \$79.81	4,150 \$4,150.00 \$79.81	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	0 0 \$720.00 \$5.85	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	1.30 \$777.60 \$14.95	
621	Alliance, Ohio: Northwest— Quantity Cost Cost per family	0 9,500 \$9,500.00 \$182.70	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	0 0 \$720.00 \$5.85	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	
	Southeast— Quantity Cost Cost per family	0 13,500 \$13,500.00 \$83.38	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	30 30 \$1,200.00 \$10.00	19 19 \$760.00 \$6.33	5,061 0 \$5,061.00 \$63.26	0 0 \$840.00 \$6.93	21 0 \$840.00 \$6.93	17.02 \$10,212.00 \$47.94	
574	Alton, Ill.: Broadway— Quantity Cost Cost per family	0 8,900 \$8,900.00 \$155.42	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	0 0 \$720.00 \$5.85	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	
	East Alton— Quantity Cost Cost per family	0 400 \$400.00 \$26.67	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	0 0 \$720.00 \$5.85	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	
	Milton Hill— Quantity Cost Cost per family	0 28,000 \$28,000.00 \$43.73	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	0 0 \$720.00 \$5.85	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	.84 \$504.00 \$1.77	
59	Bath, Me.: Quantity Cost Cost per family	0 3,997 \$3,997.00 \$152.00 \$1.69	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	24 24 \$960.00 \$8.00	15 15 \$600.00 \$5.00	1,767 895 \$1,767.00 \$14.91	17 17 \$680.00 \$5.67	17 17 \$680.00 \$5.67	.15 \$90.00 \$1.00	
24	Bethlehem, Pa.: Quantity Cost Cost per family	0 146,593 \$146,593.00 \$116.50	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	80 80 \$3,200.00 \$26.67	10 10 \$400.00 \$3.33	24,100 13,200 \$24,100.00 \$19.16	184 184 \$7,360.00 \$5.85	11.03 \$6,618.00 \$5.26		
102	Bridgeport, Conn: Houses—Black Rock (1)— Quantity Cost Cost per family	0 2,395 \$2,395.00 \$11.09	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	11 11 \$440.00 \$3.63	11 11 \$440.00 \$3.63	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	.59 \$354.00 \$1.64	
	Connecticut Avenue (14)— Quantity Cost Cost per family	0 3,110 \$3,110.00 \$28.80	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	11 11 \$440.00 \$3.63	2 2 \$80.00 \$6.67	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	.16 \$96.00 \$0.89	
	Crane (14)— Quantity Cost Cost per family	0 3,067 \$3,067.00 \$8.80	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	30 30 \$1,200.00 \$10.00	30 30 \$1,200.00 \$10.00	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	.34 \$204.00 \$0.54	
	Grasmere (12)— Quantity Cost Cost per family	0 3,705 \$3,705.00 \$0.50	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	5 5 \$200.00 \$16.67	2 2 \$80.00 \$6.67	\$3,675.00 \$30.63	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	
	Mill Green (5)— Quantity Cost Cost per family	0 2,287 \$2,287.00 \$0.45	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	28 28 \$1,120.00 \$9.33	23 23 \$920.00 \$7.67	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	.40 \$240.00 \$2.16	
	Mill Green Cemetery Extension Quantity Cost Cost per family	0 1,980 \$1,980.00 \$20.63	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	10 10 \$400.00 \$3.33	10 10 \$400.00 \$3.33	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	
1024	Temporary Flats—Cemetery Site— Quantity Cost Cost per family	0 275 \$275.00 \$1.30	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	9 9 \$360.00 \$3.00	7 7 \$280.00 \$2.33	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	
	Hill Top— Quantity Cost Cost per family	0 525 \$525.00 \$2.79	0 0 \$17,255.00 \$140.28	0 0 \$220.00 \$1.79	0 0 \$720.00 \$5.85	0 0 \$6,482.00 \$87.36	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	0 0 \$880.00 \$7.79	

14 cesspools.

24 cesspools.

Roadways are divided into three classes according to cost. Class A comprises those costing over \$2.50 per square yard exclusive of heavy grading, such as asphalt, brick, and bituminous concrete on concrete base. Those in Class B range from \$2.50 to \$1.50 per square yard, such as bituminous macadam and uncoated cement concrete. Class C includes dirt, gravel, and light waterbound macadam, costing under \$1.50 per square yard. Alley, if constructed at all, are normally required to be paved with Class B pavement. Paved gutters are listed separately only where they are not included in the roadway area. Combined curb and gutter is split up and part of the cost entered under curb and part under gutter. Dirt and grass gutters are included under planting strips.

No.	Project.	Roadways			Alleys.	Curbs.	Gutters	Sidewalks	Planting strips.	Street trees.	Total.
		Class A.	Class B.	Class C.							
	Unit cost.....	Square yard \$3.00	Square yard \$2.00	Square yard \$1.00	Square yard \$2.00	Linear foot \$0.80	Linear foot \$0.50	Square yard \$2.00	Square yard \$0.25	\$5.00	
56	Aberdeen, Md.: Quantity..... Cost..... Cost per family.....	0 0 \$6,738.00	0 0 \$84.99	6,738 \$10,537.00 \$84.23	447 \$894.00 \$11.18	0 0 0	0 0 0	2,621 \$5,242.00 \$5.53	2,310 \$577.50 \$7.22	160 \$360.00 \$12.00	..... \$21,091.00 \$400.02
185	Alabama nitrate district: Florence— Quantity..... Cost..... Cost per family.....	0 0 \$10,454.00	5,227 \$10,537.00 \$84.99	10,537 \$10,537.00 \$5.67	1,101 \$2,202 \$17.00	7,228 \$5,720.00 \$47.01	6,988 \$3,494.00 \$28.41	4,097 \$8,194.00 \$66.62	7,007 \$1,766.75 \$14.36	225 \$1,350.00 \$10.98	..... \$87,249.15 \$708.54
547	Sheffield— Quantity..... Cost..... Cost per family.....	0 0 \$14,363.00	0 0 \$125.99	14,363 \$125.99	1,009 \$2,018.00 \$17.70	11,964 \$9,551.20 \$83.96	9,521 \$4,762.00 \$41.77	3,818 \$7,636.00 \$7.75	8,197 \$2,049.25 \$17.97	271 \$1,626.00 \$14.26	..... \$84,000.95 \$738.17
1165	Tusculum— Quantity..... Cost..... Cost per family.....	0 0 \$7,616.00	0 0 \$146.46	7,616 \$7,616.00 \$146.46	1,493 \$2,986.00 \$57.42	5,504 \$4,451.20 \$85.60	1,506 \$2,238.00 \$44.19	2,236 \$4,472.00 \$86.00	3,938 \$444.50 \$18.93	122 \$852.00 \$14.08	..... \$28,467.30 \$547.44
621	Alliance, Ohio: Northwest— Quantity..... Cost..... Cost per family..... Southeast— Quantity..... Cost..... Cost per family.....	0 0 \$1,184.00 0 0 \$26,464.00	0 0 \$80.41 0 0 \$124.24	1,184 \$1,184.00 \$80.41 26,464 \$26,464.00 \$124.24	0 0 0 1,446 \$2,892.00 \$13.58	0 0 0 0 0 0	0 0 0 0 0 0	1,594 \$3,186.00 \$61.27 6,996 \$13,992.00 \$85.69	3,999 \$999.75 \$19.23 14,788 \$3,697.00 \$17.35	92 \$552.00 \$10.62 190 \$1,110.00 \$5.35	..... \$22,141.75 \$425.44 \$66,551.00 \$454.67
534	Alton, Ill.: Broadway— Quantity..... Cost..... Cost per family..... East Alton— Quantity..... Cost..... Cost per family..... Milton Hill— Quantity..... Cost..... Cost per family.....	2,308 \$6,924.00 \$144.24 0 0 \$4,297.00 27,542 \$27,542.00 \$90.00	0 0 \$16.66 0 0 \$219.00 0 0 0	2,308 \$20.00 \$16.66 4,297 \$4,297.00 \$219.00 0 0 0	283 \$566.00 \$1.79 509 \$1,138.00 \$7.76 177 \$354.00 \$1.25	1,560 \$1,248.00 \$26.00 1,110 \$842.00 \$8.00 16,386 \$13,108.00 \$46.16	1,560 \$740.00 \$16.25 1,110 \$740.00 \$8.00 12,724 \$10,179.00 \$22.40	867 \$1,734.00 \$36.19 570 \$1,140.00 \$76.00 7,595 \$15,190.00 \$53.49	693 \$173.25 \$3.52 637 \$174.25 \$11.62 16,517 \$1,129.25 \$14.54	28 \$228.00 \$4.75 30 \$180.00 \$12.00 378 \$2,268.00 \$7.00	..... \$24,352.25 \$334.75 \$8,466.75 \$105.91 \$70,750.25 \$595.99
59	Bath, Me.: Quantity..... Cost..... Cost per family.....	0 0 \$3,372.00	0 0 \$59.69	3,372 \$3,372.00 \$59.69	0 0 0	0 0 0	0 0 0	1,666 \$3,332.00 \$83.69	3,167 \$71.75 \$8.80	113 \$678.00 \$8.53	..... \$26,924.25 \$298.12
24	Bethlehem, Pa.: Quantity..... Cost..... Cost per family.....	0 0 \$96,300.00	0 0 \$36,300.00	96,300 \$96,300.00 \$36.30	1,058 \$3,165.00 \$2.64	66,000 \$52,800.00 \$41.97	0 0 0	29,700 \$59,400.00 \$87.22	91,481 \$22,871.00 \$18.18	1,591 \$1,591.00 \$7.59	..... \$174,014.00 \$377.78
102	Bridgeport, Conn.: Houses—Black Rock— Quantity..... Cost..... Cost per family..... Connecticut Avenue (11) Quantity..... Cost..... Cost per family..... Crane (4)— Quantity..... Cost..... Cost per family..... Grasmere (12)— Quantity..... Cost..... Cost per family..... Mill Green (5)— Quantity..... Cost..... Cost per family..... Mill Green Cemetery Extension Quantity..... Cost..... Cost per family.....	0 0 \$5,280.00 0 0 \$3,213.00 0 0 \$19,920.00 0 0 \$7,170.00 0 0 \$8,446.00 0 0 \$7,026.00	0 0 \$24.44 0 0 \$29.94 0 0 \$70.28 0 0 \$70.28 0 0 \$70.28 0 0 \$70.28	5,280 \$5,280.00 \$24.44 3,213 \$3,213.00 \$29.94 19,920 \$19,920.00 \$70.28 7,170 \$7,170.00 \$70.28 8,446 \$8,446.00 \$70.28 7,026 \$7,026.00 \$70.28	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3,420 \$2,736.00 \$12.67 2,000 \$1,600.00 \$14.81 12,548 \$10,038.40 \$26.62 0 0 0 5,000 \$1,000.00 \$36.61 0 0 0 5,000 \$1,000.00 \$36.61	0 0 0 1,090 \$545.00 \$5.04 12,548 \$6,274.00 \$16.64 0 0 0 0 0 0 0 0 0 0 0	0 0 0 984 \$1,968.00 \$18.22 5,518 \$11,036.00 \$29.27 1,913 \$3,826.00 \$37.88 3,270 \$6,540.00 \$63.88 3,038 \$6,076.00 \$63.88 3,470 \$6,940.00 \$63.88	2,027 \$50.75 \$2.45 1,052 \$2,104.00 \$2.43 17,444 \$4,360.00 \$8.84 3,270 \$6,540.00 \$63.88 3,038 \$6,076.00 \$63.88 3,470 \$6,940.00 \$63.88	42 \$852.00 \$11.17 35 \$10.00 \$1.00 200 \$1,200.00 \$6.00 58 \$348.00 \$3.45 58 \$348.00 \$3.45 85 \$510.00 \$5.31	..... \$1,444.40 \$8.68 \$1,155.00 \$121.84 \$6,540.40 \$187.06 \$218.51 \$23,779.50 \$237.29
102a	Temporary Flats—Cemetery Site— Quantity..... Cost..... Cost per family..... Hill Top— Quantity..... Cost..... Cost per family.....	0 0 \$8,742.00 0 0 \$51.35	4,371 \$8,742.00 \$41.24 4,827 \$9,654.00 \$51.35	0 0 \$41.24 0 0 \$51.35	0 0 0 0 0 0	0 0 0 3,468 \$2,774.40 \$14.76	0 0 0 0 0 0	2,093 \$1,156.00 \$19.75 1,332 \$2,664.00 \$14.76	2,036 \$500.00 \$2.40 3,256 \$814.00 \$4.33	124 \$744.00 \$3.51 110 \$660.00 \$3.51	..... \$21,093.50 \$90.50 \$1,011.00 \$10.11

TABLE VII.—General improvements directly chargeable

No.	Project.	Clearing.	Heavy grading.	Storm drains.	Combined sewers.	Inlets.	Manholes.	Sanitary sewers.			Public grounds development.
								8 inches.	Over 8 inches.	Manholes.	
		Acres	Cubic yards.	Linear feet.	Linear feet.			Linear feet.	Linear feet.		Acres
	Unit cost.....		\$1.00	\$3.50	\$3.50	\$20.00	\$40.00	\$1.00	\$1.50	\$40.00	\$600.00
456	Butler, Pa.: Quantity..... Cost..... Cost per family.....	0 22,695 \$22,695.00 \$135.90	22,695 \$22,695.00 \$135.90	×	×	×	×	4,550 \$4,550.00 \$27.31	0	21 \$840.00 \$5.03	0
565	Charleston, S. C.: Quantity..... Cost..... Cost per family.....	7.0 \$525.00 \$3.37	15,120 \$15,120.00 \$96.92	0	0	0	0	3,835 \$3,835.00 \$24.58	2,523 \$3,784.50 \$24.26	23 \$920.00 \$5.90	4.28 \$2,568.00 \$16.46
18	Charleston, W. Va.: Quantity..... Cost..... Cost per family.....	0 20,390 \$20,390.00 \$234.37	20,390 \$20,390.00 \$234.37	0	3,965 \$13,877.50 \$159.48	22 \$440.00 \$5.06	20 \$800.00 \$9.19	0	0	0	2.23 \$1,338.00 \$15.38
	Chester, Pa.: Eddystone— Quantity..... Cost..... Cost per family.....	0 12.0 \$2,400.00 \$4.14	37,000 \$37,000.00 \$63.79	1,724 \$6,034.00 \$10.40	0	12 \$240.00 \$0.41	8 \$320.00 \$0.55	8,226 \$8,226.00 \$14.18	4,981 \$7,471.50 \$12.88	55 \$220.00 \$0.38	16.53 \$9,918.00 \$17.10
2947	Ridley Park— Quantity..... Cost..... Cost per family.....	10.0 \$2,000.00 \$3.54	40,000 \$40,000.00 \$70.79	4,670 \$16,345.00 \$28.93	0	25 \$500.00 \$0.88	19 \$760.00 \$1.35	0	10,450 \$15,675.00 \$27.74	41 \$1,640.00 \$2.90	9.00 \$5,400.00 \$9.56
243	Dayton, Ohio: Edgemont— Quantity..... Cost..... Cost per family.....	0 82,143 \$82,143.00 \$104.37	82,143 \$82,143.00 \$104.37	10,163 \$35,570.50 \$45.07	0	56 \$1,120.00 \$2.18	57 \$2,286.00 \$2.89	13,900 \$13,900.00 \$17.66	4,330 \$6,495.00 \$8.25	134 \$5,360.00 \$6.81	25.52 \$15,312.00 \$19.43
	Leo Street— Quantity..... Cost..... Cost per family.....	0 784 \$784.00 \$19.60	784 \$784.00 \$19.60	0	0	0	0	900 \$900.00 \$22.50	2,169 \$3,253.50 \$81.34	16 \$640.00 \$16.00	0
244a	Elizabeth, N. J.: Site A— Quantity..... Cost..... Cost per family.....	×	4,356 \$100.00 \$2.00	0 \$4,356.00 \$87.12	1,120 \$3,920.00 \$78.40	2 \$40.00 \$0.80	6 \$240.00 \$4.80	0	0	0	0
	Site B— Quantity..... Cost..... Cost per family.....	×	15,600 \$100.00 \$0.96	0 \$15,600.00 \$150.00	1,330 \$4,655.00 \$44.76	0	12 \$480.00 \$4.62	0	0	0	0
	Site D— Quantity..... Cost..... Cost per family.....	×	1,343 \$1,480.00 \$29.60	0 \$1,343.00 \$26.86	920 \$3,220.00 \$64.40	0	3 \$120.00 \$2.40	0	0	0	0
10	Erie, Pa.: East— Quantity..... Cost..... Cost per family.....	×	8,600 \$1,500.00 \$6.73	1,910 \$6,685.00 \$38.57	0	21 \$420.00 \$1.88	4 \$160.00 \$0.72	5,390 \$5,390.00 \$24.17	0	29 \$1,160.00 \$5.20	1.88 \$1,128.00 \$5.06
	West— Quantity..... Cost..... Cost per family.....	×	46,951 \$1,720.00 \$3.45	7,350 \$46,951.00 \$94.09	0	55 \$1,100.00 \$1.12	19 \$760.00 \$1.52	13,278 \$13,278.00 \$26.61	1,020 \$1,530.00 \$3.07	57 \$2,280.00 \$4.57	6.50 \$3,900.00 \$7.82
457	Hammond, Ind.: Quantity..... Cost..... Cost per family.....	0 13,180 \$13,180.00 \$75.75	13,180 \$13,180.00 \$75.75	0	7,887 \$27,604.50 \$158.65	33 \$660.00 \$3.79	28 \$1,120.00 \$6.44	0	0	0	0
1578	Ilion, N. Y.: Quantity..... Cost..... Cost per family.....	×	500 \$100.00 \$0.63	0 \$500.00 \$3.14	0	0	0	4,275 \$4,275.00 \$27.76	0	9 \$360.00 \$2.34	.41 \$248.40 \$1.56
1314	Indianapolis, Ind.: Quantity..... Cost..... Cost per family.....	0 1,990 \$1,990.00 \$90.45	1,990 \$1,990.00 \$90.45	0	850 \$2,975.00 \$61.98	1 \$20.00 \$0.42	2 \$80.00 \$1.68	0	0	0	.39 \$234.00 \$10.64
496	Indianhead, Md.: Quantity..... Cost..... Cost per family.....	10.0 \$600.00 \$3.16	30,000 \$30,000.00 \$157.89	2,371 \$8,298.50 \$43.67	×	15 \$300.00 \$1.57	×	11,494 \$11,494.00 \$60.49	0	×	53.10 \$31,860.00 \$167.36
607	Kenilworth, N. J.: Site E— Quantity..... Cost..... Cost per family.....	0 3,517 \$3,517.00 \$67.63	3,517 \$3,517.00 \$67.63	0	0	0	0	0	0	0	0
398a	Lowell, Mass.: High Street Extension— Quantity..... Cost..... Cost per family.....	0 10,000 \$10,000.00 \$120.48	10,000 \$10,000.00 \$120.48	0	0	0	0	0 \$5,190.00 \$61.06	3,460 \$5,190.00 \$61.06	32 \$1,250.00 \$15.06	.48 \$288.00 \$3.47
	Livingston— Quantity..... Cost..... Cost per family.....	0 7,000 \$7,000.00 \$175.00	7,000 \$7,000.00 \$175.00	0	2,940 \$10,290.00 \$257.25	0	17 \$680.00 \$17.00	0	0	0	.90 \$340.00 \$13.50
2972	Lyles (Wrigley), Tenn.: Quantity..... Cost..... Cost per family.....	2.5 \$375.00 \$3.41	12,350 \$12,350.00 \$112.27	0	0	0	0	5,755 \$5,755.00 \$52.32	0	25 \$1,000.00 \$9.09	22.95 \$13,770.00 \$125.18
	Colored— Quantity..... Cost..... Cost per family.....	0 0 \$760.00 \$50.70	0 0 \$760.00 \$50.70	0	0	0	0	760 \$760.00 \$50.70	0	3 \$120.00 \$8.00	0
541	Mare Island (Vallejo), Calif.: Houses— Quantity..... Cost..... Cost per family.....	0 53,150 \$53,150.00 \$126.84	53,150 \$53,150.00 \$126.84	832 \$2,912.00 \$6.95	0	22 \$440.00 \$1.05	0	13,010 \$13,010.00 \$31.05	550 \$825.00 \$1.97	85 \$3,400.00 \$8.11	5.14 \$3,084.00 \$7.36

to project (including previous improvements)—Continued.

No.	Project.	Roadways.			Alleys.	Curbs.	Gutters.	Sidewalks.	Planting strips.	Street trees.	Total.
		Class A.	Class B.	Class C.							
	Unit cost	Square yard.	Square yard.	Square yard.	Square yard.	Linear foot.	Linear foot.	Square yard.	Square yard.		
456	Butler, Pa.: Quantity..... Cost..... Cost per family.....	\$3.00 0 \$10,456.00	\$2.00 0 \$10,456.00	\$1.00 10,456 \$10,456.00	\$2.00 0 \$10,456.00	\$0.80 8,930 \$7,144.00	\$0.50 0 \$0.00	\$2.00 4,107 \$8,214.00	\$0.25 10,663 \$2,665.75	\$6.00 195 \$7.01	..... \$57,734.75 \$349.67
565	Charleston, S. C.: Quantity..... Cost..... Cost per family.....	0 2,200 \$1,400.00	2,200 \$11,700.00 \$28.21	11,700 \$75.00	0 0 \$11,700.00	0 0 \$11,700.00	0 0 \$11,700.00	5,854 \$11,708.00 \$75.05	20,080 \$5,020.00 \$32.18	150 \$900.00 \$5.77	..... \$60,480.50 \$387.70
18	Charleston, W. Va.: Quantity..... Cost..... Cost per family.....	0 7,966 \$15,932.00	7,966 \$183.13	0 0 \$183.13	0 0 \$183.13	6,240 \$4,992.00 \$57.38	0 0 \$57.38	1,126 \$2,532.00 \$29.10	5,624 \$1,406.00 \$10.16	188 \$1,128.00 \$12.97	..... \$62,835.50 \$722.22
1635	Chester, Pa.: Eddystone— Quantity..... Cost..... Cost per family.....	0 032,933 \$65,866.00	032,933 \$113.46	15,979 \$15,979.00 \$27.55	736 \$1,472.00 \$2.54	23,952 \$19,162.00 \$33.04	0 0 \$33.04	12,292 \$24,584.00 \$42.39	20,256 \$5,064.00 \$8.73	565 \$3,390.00 \$5.84	..... \$207,346.50 \$357.38
2947	Ridley Park— Quantity..... Cost..... Cost per family.....	0 10,032 \$20,064.00	10,032 \$35.76	9,728 \$9,728.00 \$17.22	0 0 \$17.22	24,016 \$19,213.00 \$34.01	0 0 \$34.01	12,678 \$25,356.00 \$44.88	16,310 \$4,000.00 \$7.22	600 \$3,600.00 \$6.37	..... \$164,359.00 \$291.15
213	Dayton, Ohio: Edgemont— Quantity..... Cost..... Cost per family.....	2,635 \$7,905.00 \$10.04	54,414 \$108,828.00 \$138.28	0 0 \$138.28	1,618 \$3,236.00 \$4.11	5,256 \$4,205.00 \$5.34	28,968 \$14,434.00 \$18.37	18,348 \$36,692.00 \$46.62	30,012 \$7,503.00 \$9.33	698 \$4,188.00 \$5.32	..... \$349,797.50 \$444.27
	Leo Street— Quantity..... Cost..... Cost per family.....	0 1,130 \$2,260.00	1,130 \$26.50	477 \$477.00 \$11.93	0 0 \$11.93	960 \$368.00 \$19.20	0 0 \$19.20	715 \$1,430.00 \$35.75	567 \$142.00 \$3.55	23 \$138.00 \$3.45	..... \$10,392.50 \$269.82
244a	Elizabeth, N. J.: Site A— Quantity..... Cost..... Cost per family.....	0 3,954 \$7,908.00	3,954 \$158.16	0 0 \$158.16	0 0 \$158.16	500 \$400.00 \$8.00	0 0 \$8.00	982 \$1,964.00 \$39.28	2,247 \$561.75 \$11.24	49 \$294.00 \$5.88	..... \$19,783.75 \$395.68
	Site B— Quantity..... Cost..... Cost per family.....	0 4,280 \$8,560.00	4,280 \$82.31	0 0 \$82.31	2,373 \$4,746.00 \$45.03	2,040 \$1,632.00 \$15.69	0 0 \$15.69	903 \$1,806.00 \$17.37	1,657 \$413.10 \$3.97	49 \$294.00 \$2.83	..... \$48,290.00 \$308.14
	Site D— Quantity..... Cost..... Cost per family.....	0 4,942 \$9,884.00	4,942 \$197.68	0 0 \$197.68	0 0 \$197.68	2,220 \$1,776.00 \$35.52	0 0 \$35.52	1,161 \$2,322.00 \$46.44	2,165 \$541.25 \$10.83	30 \$180.00 \$3.60	..... \$20,866.23 \$417.33
10	Erie, Pa.: East— Quantity..... Cost..... Cost per family.....	0 17,070 \$34,140.00	17,070 \$153.69	0 0 \$153.69	3,520 \$7,040.00 \$31.57	0 0 \$31.57	0 0 \$31.57	6,828 \$13,656.00 \$61.24	17,898 \$4,474.50 \$20.07	351 \$2,106.00 \$9.44	..... \$66,479.50 \$387.72
	West— Quantity..... Cost..... Cost per family.....	0 0 \$0.00	0 0 \$0.00	37,670 \$37,670.00 \$75.39	4,128 \$8,256.00 \$16.55	0 0 \$16.55	0 0 \$16.55	13,195 \$26,390.00 \$32.89	33,494 \$8,298.50 \$16.63	523 \$3,138.00 \$6.29	..... \$147,093.65 \$361.65
457	Hammond, Ind.: Quantity..... Cost..... Cost per family.....	18,508 \$37,016.00 \$212.74	0 0 \$0.00	0 0 \$0.00	0 0 \$0.00	12,732 \$10,184.00 \$58.53	0 0 \$58.53	13,500 \$27,000.00 \$155.17	0 0 \$0.00	165 \$990.00 \$5.69	..... \$117,755.00 \$676.76
578	Ilion, N. Y.: Quantity..... Cost..... Cost per family.....	0 0 \$0.00	0 0 \$0.00	13,228 \$13,228.00 \$83.19	0 0 \$83.19	0 0 \$83.19	0 0 \$83.19	3,957 \$7,914.00 \$49.77	7,195 \$1,798.75 \$11.31	176 \$1,056.00 \$6.65	..... \$29,480.15 \$186.35
1314	Indianapolis, Ind.: Quantity..... Cost..... Cost per family.....	0 0 \$0.00	0 0 \$0.00	631 \$631.00 \$28.68	0 0 \$28.68	0 0 \$28.68	0 0 \$28.68	238 \$476.00 \$21.65	1,403 \$350.75 \$15.94	30 \$180.00 \$3.60	..... \$6,936.75 \$239.62
496	Indianhead, Md.: Quantity..... Cost..... Cost per family.....	0 40,896 \$81,792.00	40,896 \$430.48	0 0 \$430.48	0 0 \$430.48	0 0 \$430.48	0 0 \$430.48	15,822 \$31,644.00 \$166.55	40,913 \$10,228.00 \$53.83	420 \$2,520.00 \$13.26	..... \$181,736.50 \$1,098.26
607	Kenilworth, N. J., Site E: Quantity..... Cost..... Cost per family.....	0 0 \$0.00	0 0 \$0.00	3,904 \$3,904.00 \$75.08	0 0 \$75.08	0 0 \$75.08	0 0 \$75.08	987 \$1,974.00 \$37.96	2,294 \$573.50 \$11.03	50 \$300.00 \$5.77	..... \$10,268.50 \$197.47
398a	Lowell: Houses— High Street Extension— Quantity..... Cost..... Cost per family.....	0 0 \$0.00	0 0 \$0.00	5,120 \$5,120.00 \$61.69	0 0 \$61.69	230 \$184.00 \$2.21	0 0 \$2.21	1,426 \$2,852.00 \$34.36	2,786 \$696.50 \$8.39	150 \$900.00 \$10.84	..... \$26,480.50 \$317.56
	Livingston— Quantity..... Cost..... Cost per family.....	0 0 \$0.00	0 0 \$0.00	4,968 \$4,968.00 \$124.20	0 0 \$124.20	394 \$315.20 \$7.88	0 0 \$7.88	1,356 \$2,712.00 \$67.80	1,821 \$455.25 \$11.38	50 \$300.00 \$7.50	..... \$27,260.45 \$681.51
2972	Lyles (Wrigley), Tenn.: Quantity..... Cost..... Cost per family.....	0 0 \$0.00	0 0 \$0.00	12,706 \$12,706.00 \$115.45	0 0 \$115.45	0 0 \$115.45	0 0 \$115.45	4,316 \$8,632.00 \$78.47	14,211 \$3,553.00 \$32.30	230 \$1,380.00 \$12.55	..... \$59,521.00 \$441.04
	Colored— Quantity..... Cost..... Cost per family.....	0 0 \$0.00	0 0 \$0.00	2,021 \$2,021.00 \$134.73	0 0 \$134.73	0 0 \$134.73	0 0 \$134.73	459 \$918.00 \$61.20	1,493 \$373.00 \$24.87	15 \$90.00 \$6.00	..... \$4,282.00 \$285.50
581	Mare Island (Vallejo), Calif.: Houses— Quantity..... Cost..... Cost per family.....	0 33,542 \$67,084.00	33,542 \$160.09	0 0 \$160.09	2,543 \$5,086.00 \$12.14	21,320 \$17,056.00 \$40.71	0 0 \$40.71	10,580 \$21,160.00 \$50.50	13,956 \$3,489.00 \$8.33	470 \$2,820.00 \$6.73	..... \$193,516.00 \$461.83

TABLE VII.—General improvements directly chargeable

No.	Project.	Clearing.	Heavy grading.	Storm drains.	Combined sewers.	Inlets.	Manholes.	Sanitary sewers.			Public grounds development.
								8 inches.	Over 8 inches.	Manholes.	
	Unit cost.	Acres.	Cubic yards.	Linear feet.	Linear feet.			Linear feet.	Linear feet.		Acres.
381	Milton, Pa.—		\$1.00	\$3.50	\$3.50	\$20.00	\$40.00	\$1.00	\$1.50	\$40.00	\$600.00
	Hepburn Street										
	Quantity.....	0	0	×	0	×	0	520	0	2	0
	Cost.....							\$520.00		\$80.00	
	Cost per family.....							\$21.67		\$3.33	
	Site B—										
	Quantity.....	0	2,450	×	0	×	0	498	1,517	13	2.25
	Cost.....		\$2,450.00					\$498.00	\$2,275.50	\$520.00	\$1,350.00
	Cost per family.....		\$37.13					\$7.55	\$34.48	\$17.88	\$20.45
997	Muskegon, Mich.:—										
	McGraft—										
	Quantity.....	0	11,700	0	0	0	0	6,448	260	30	.73
	Cost.....		\$11,700.00					\$6,448.00	\$390.00	\$1,200.00	\$438.00
	Cost per family.....		\$47.18					\$26.00	\$1.58	\$4.84	1.77
	Schoenberg—										
	Quantity.....	0	1,010	0	0	0	0	1,798	0	6	0
	Cost.....		\$1,010.00					\$1,798.00		\$240.00	
	Cost per family.....		\$30.67					\$59.93		\$8.00	
880	Neville Island, Pa., Coraopolis:										
	Quantity.....	0	0	0	0	0	0	2,830	920	12	1.29
	Cost.....							\$2,830.00	\$1,380.00	\$480.00	\$774.00
	Cost per family.....							\$37.73	\$18.40	\$6.10	\$10.32
271	New Brunswick, N. J.:—										
	Quantity.....	0	43,400	600	0	4	3	11,603	325	81	4.41
	Cost.....		\$43,400.00	\$2,100.00		\$80.00	\$120.00	\$11,603.00	\$487.50	\$3,240.00	\$2,646.00
	Cost per family.....		\$109.32	\$5.29		\$0.20	\$0.30	\$2.92	\$1.23	\$8.16	6.66
1371	New Castle, Del.:—										
	Quantity.....	0	2,610	0	0	0	0	2,715	3,920	40	0.163
	Cost.....		\$2,610.00					\$2,715.00	\$5,880.00	\$1,600.00	\$98.00
	Cost per family.....		\$56.74					\$59.02	\$127.83	\$34.78	\$2.13
157	New London, Conn.:—										
	Quantity.....	0	18,541	1,710	×	9	5	3,578	0	21	0.27
	Cost.....		\$18,541.00	\$5,985.00		\$180.00	\$200.00	\$3,578.00		\$840.00	\$162.00
	Cost per family.....		\$113.74	\$36.72		\$1.10	\$1.23	\$21.95		\$5.15	\$0.994
	Groton—										
	Quantity.....	0	600	×	×	×	×	1,455	0	×	0
	Cost.....		\$600.00					\$1,455.00			
	Cost per family.....		\$24.00					\$58.20			
722	New Orleans, La.:—										
	Quantity.....	×	120,000	9,613	×	87	35	7,760	155	35	1.56
	Cost.....	\$140.00	\$120,000.00	\$33,645.50		\$1,740.00	\$1,400.00	\$7,760.00	\$232.50	\$1,400.00	\$366.00
	Cost per family.....	\$2.11	\$574.11	\$160.98		\$8.33	\$6.70	\$37.13	\$1.11	\$6.70	\$1.75
382	Newport, R. I.:—										
	Quantity.....	0	12,100	×	×	×	×	1,540	790	10	0.38
	Cost.....		\$12,100.00					\$1,540.00	\$1,185.00	\$400.00	\$228.00
	Cost per family.....		\$177.95					\$22.65	\$17.42	\$5.88	\$3.35
	Jamestown—										
	Quantity.....	0	3,540	×	×	×	×	670	×	4	0
	Cost.....		\$3,540.00					\$670.00		\$160.00	
	Cost per family.....		\$354.00					\$67.00		\$16.00	
57a	Newport News, Va.:—										
	Hilton Extension										
	Quantity.....	78.0	×	×	0	0	0	×	×	×	2.07
	Cost.....	\$11,700.00									\$1,242.00
	Cost per family.....	\$25.16									\$2.67
57c	Briarfield—										
	Quantity.....	0	20,742	0	0	0	0	2,240	14,000	57	24.19
	Cost.....		\$20,742.00					\$2,240.00	\$21,000.00	\$228.00	\$14,514.00
	Cost per family.....		\$37.71					\$4.07	\$38.20	\$4.15	\$26.39
404	Niagara Falls, N. Y.:—										
	Site A—										
	Quantity.....	0	11,661	0	5,160	22	19	0	0	0	0
	Cost.....		\$11,661.00		\$18,060.00	\$440.00	\$760.00				
	Cost per family.....		\$87.68		\$135.79	\$3.31	\$5.71				
	Site B—										
	Quantity.....	0	6,772	0	5,440	20	16	0	0	0	.03
	Cost.....		\$6,772.00		\$19,040.00	\$400.00	\$640.00				\$21.00
	Cost per family.....		\$33.86		\$95.20	\$2.00	\$3.20				\$0.10
	Site C—										
	Quantity.....	0	5,678	0	2,140	9	6	0	0	0	.24
	Cost.....		\$5,678.00		\$7,490.00	\$180.00	\$240.00				\$144.00
	Cost per family.....		\$83.50		\$113.09	\$2.65	\$3.50				\$2.12
481	Niles, Ohio:—										
	Quantity.....		27,889	2,620	0	21	11	3,050	600	20	.37
	Cost.....	\$1,000.00	\$27,889.00	\$9,170.00		\$420.00	\$440.00	\$3,050.00	\$900.00	\$800.00	\$222.00
	Cost per family.....	\$8.55	\$238.30	\$80.43		\$3.68	\$3.86	\$26.76	\$7.89	\$7.02	\$1.90
150a	Norfolk district:—										
	Craddock, Va.—										
	Quantity.....	×	83,720	9,710	0	43	22	45,375	11,681	264	49.64
	Cost.....	\$4,200.00	\$83,720.00	\$33,985.00		\$860.00	\$880.00	\$45,375.00	\$17,521.50	\$10,560.00	\$29,784.00
	Cost per family.....	\$3.40	\$67.75	\$27.56		\$0.70	\$0.71	\$36.50	\$10.20	\$8.56	\$24.12
150b	Glenwood Park, Va.—										
	Quantity.....	0	11,140	0	0	0	0	14,210	2,377	74	10.53
	Cost.....		\$11,140.00					\$14,210.00	\$3,565.50	\$206.00	\$6,318.00
	Cost per family.....		\$17.15					\$21.92	\$5.50	\$4.74	\$9.75
150c	Truxton, Va.—										
	Quantity.....	0	18,427	1,126	0	8	5	(1)	0	0	4.06
	Cost.....		\$18,427.00	\$3,941.00		\$160.00	\$200.00	\$18,975.00			\$2,436.00
	Cost per family.....		\$72.83	\$15.58		\$0.63	\$0.79	\$75.00			\$9.63
60	Pensacola, Fla.:—										
	Quantity.....	9.0	2,500	0	0	0	0	5,598	1,265	29	2.10
	Cost.....	\$2,384.00	\$2,500.00					\$5,598.00	\$1,897.50	\$1,160.00	\$1,260.00
	Cost per family.....	\$17.64	\$18.52					\$41.47	\$14.56	\$8.59	\$9.33

1 253 cesspools

to project (including previous improvements)—Continued.

No.	Project.	Roadways.			Alleys.	Curbs.	Gutters.	Sidewalks.	Planting strips.	Street trees.	Total.
		Class A.	Class B.	Class C.							
	Unit cost	Square yard \$3.00	Square yard \$2.00	Square yard \$1.00	Square yard \$2.00	Linear foot \$0.80	Linear foot \$0.50	Square yard \$2.00	Square yard \$0.25	\$6.00	
381	Milton, Pa.: Hepburn Street—										
	Quantity	0	2,467	0	442	1,325	1,325	605	590	20	
	Cost		\$4,934.00		\$884.00	\$1,060.00	\$663.00	\$1,210.00	\$148.00	\$120.00	\$9,619.00
	Cost per family		\$205.38		\$36.83	\$44.17	\$27.63	\$50.42	\$6.17	\$5.00	\$400.80
	Site B—										
	Quantity	0	9,644	0	0	6,260	0	2,071	4,195	40	
	Cost		\$19,288.00			\$5,008.00		\$4,142.00	\$1,019.00	\$240.00	\$36,820.50
	Cost per family		\$292.24			\$75.88		\$62.76	\$15.89	\$3.64	\$567.90
997	Muskegon, Mich.: McGraft—										
	Quantity	0	22,389	0	0	0	0	6,992	16,587	300	
	Cost		\$44,778.00					\$13,984.00	\$4,147.00	\$1,800.00	\$84,885.00
	Cost per family		\$180.36					\$56.39	\$16.72	\$7.26	\$342.30
	Schoenberg—										
	Quantity	0	2,544	0	649	1,840	0	960	1,652	40	
	Cost		\$5,088.00		\$1,298.00	\$1,472.00		\$1,920.00	\$413.00	\$240.00	\$13,479.00
	Cost per family		\$169.63		\$43.27	\$49.07		\$64.00	\$13.77	\$8.00	\$446.34
880	Neville Island, Pa., Coraopolis:										
	Quantity	0	0	7,464	3,196	820	0	2,770	3,440	0	
	Cost			\$7,464.00	\$6,392.00	\$656.00		\$5,540.00	\$860.00		\$26,376.00
	Cost per family			\$99.25	\$85.23	\$8.75		\$73.87	\$11.47		\$351.42
271	New Brunswick, N. J.:										
	Quantity	0	5,968	22,245	6,277	16,099	4,855	11,930	20,087	424	
	Cost		\$11,936.00	\$22,245.00	\$12,554.00	\$12,879.00	\$2,428.00	\$23,860.00	\$5,022.00	\$2,544.00	\$157,114.50
	Cost per family		\$30.07	\$56.03	\$31.62	\$32.44	\$6.12	\$60.10	\$12.65	\$6.41	\$95.60
1371	New Castle, Del.:										
	Quantity	0	900	2,816	0	0	0	0	2,800	40	
	Cost		\$1,800.00	\$2,816.00					\$700.00	\$240.00	\$18,459.00
	Cost per family		\$39.13	\$61.21					\$15.22	\$5.22	\$401.28
157	New London, Conn.:										
	Quantity	5,100	0	0	622	5,400	0	5,440	6,044	188	
	Cost	\$15,300.00			\$1,244.00	\$4,320.00		\$10,880.00	\$1,511.00	\$1,128.00	\$63,809.00
	Cost per family	\$93.87			\$7.63	\$26.50		\$66.74	\$9.26	\$6.92	\$391.80
	Groton—										
	Quantity	1,685	0	0	0	1,220	0	542	1,220	46	
	Cost	\$5,055.00				\$976.00		\$1,084.00	\$405.00	\$276.00	\$9,751.00
	Cost per family	\$202.20				\$39.04		\$43.36	\$12.20	\$11.04	\$390.04
722	New Orleans, La.:										
	Quantity	0	0	27,407	0	17,660	0	7,849	17,340	405	
	Cost			\$27,407.00		\$14,128.00		\$15,698.00	\$4,335.00	\$2,430.00	\$820,982.00
	Cost per family			\$131.13		\$67.59		\$75.11	\$20.71	\$11.63	\$1,105.12
382	Newport, R. I.:										
	Quantity	0	6,616	0	0	3,228	0	3,014	2,385	67	
	Cost		\$13,232.00			\$2,582.40		\$6,028.00	\$566.00	\$402.00	\$38,293.40
	Cost per family		\$194.59			\$37.97		\$88.04	\$8.76	\$5.91	\$563.12
	Jamestown—										
	Quantity	0	1,471	0	0	0	0	779	1,093	30	
	Cost		\$2,942.00					\$1,558.00	\$273.00	\$180.00	\$9,323.00
	Cost per family		\$294.20					\$155.80	\$27.30	\$18.00	\$932.30
57a	Newport News, Va.:										
	Hilton Extension—										
	Quantity	0	28,988	0	2,476	0	0	9,909	36,511	520	
	Cost		\$57,976.00		\$4,952.00			\$19,818.00	\$9,207.75	\$3,120.00	\$108,010.75
	Cost per family		\$124.68		\$10.65			\$42.62	\$19.79	\$6.71	\$232.28
57c	Briarfield—										
	Quantity	0	0	23,514	1,235	0	0	21,389	50,026	527	
	Cost			\$23,514.00	\$2,470.00			\$42,778.00	\$12,501.50	\$3,162.00	\$143,149.50
	Cost per family			\$42.75	\$4.49			\$77.78	\$22.73	\$5.75	\$64.06
404	Niagara Falls, N. Y.:										
	Site A—										
	Quantity	0	14,478	0	2,047	7,668	0	4,260	8,395	275	
	Cost		\$28,956.00		\$4,094.00	\$6,134.00		\$8,520.00	\$2,090.00	\$1,650.00	\$82,374.00
	Cost per family		\$217.71		\$30.78	\$46.12		\$64.06	\$15.78	\$12.41	\$619.35
	Site B—										
	Quantity	0	14,894	0	3,126	7,668	0	4,176	7,345	300	
	Cost		\$29,788.00		\$6,252.00	\$6,134.00		\$8,352.00	\$1,836.00	\$1,800.00	\$81,035.00
	Cost per family		\$148.94		\$31.26	\$30.67		\$41.76	\$9.18	\$9.00	\$405.21
	Site C—										
	Quantity	0	6,585	0	694	3,432	0	1,883	2,198	150	
	Cost		\$13,170.00		\$1,388.00	\$2,746.00		\$3,766.00	\$549.50	\$900.00	\$36,251.50
	Cost per family		\$193.67		\$20.41	\$40.38		\$55.38	\$8.08	\$13.24	\$536.02
481	Niles, Ohio:										
	Quantity	0	0	13,866	2,178	0	0	5,111	12,169	246	
	Cost			\$13,866.00	\$4,356.00			\$10,222.00	\$3,042.00	\$1,476.00	\$76,853.00
	Cost per family			\$118.51	\$37.23			\$87.37	\$26.00	\$12.61	\$660.11
	Norfolk district:										
	Cradock, Va.:										
	Quantity	0	26,951	82,408	7,960	8,360	0	50,328	130,289	1,801	
	Cost		\$53,902.00	\$82,408.00	\$15,920.00	\$6,688.00		\$1,006.56	\$32,572.25	\$10,906.00	\$430,188.31
	Cost per family		\$43.64	\$66.68	\$12.89	\$5.42		\$81.50	\$26.37	\$8.75	\$425.05
150b	Glenwood Park, Va.:										
	Quantity	0	7,467	40,018	0	760	0	11,584	28,717	1,474	
	Cost		\$14,934.00	\$40,018.00		\$608.00		\$29,168.00	\$7,186.75	\$8,724.00	\$136,168.25
	Cost per family		\$23.05	\$61.76		\$0.91		\$15.01	\$11.09	\$13.46	\$214.37
150c	Truxtun, Va.:										
	Quantity	0	0	9,000	0	0	0	8,140	20,147	235	
	Cost			\$9,000.00				\$16,280.00	\$5,037.00	\$1,410.00	\$75,836.00
	Cost per family			\$35.57				\$64.35	\$19.90	\$5.57	\$299.85
60	Pensacola, Fla.:										
	Quantity	0	0	27,051	0	0	0	7,284	24,058	224	
	Cost			\$27,051.00				\$14,568.00	\$6,015.00	\$1,344.00	\$63,774.50
	Cost per family			\$200.38				\$107.91	\$44.56	\$9.96	\$472.92

TABLE VII.—General improvements directly chargeable

No.	Project.	Clearing.	Heavy grading.	Storm drains.	Combined sewers.	Inlets.	Manholes.	Sanitary sewers.			Public grounds development.
								8 inches.	Over 8 inches.	Manholes.	
		<i>Acres</i>	<i>Cubic yards</i>	<i>Linear feet.</i>	<i>Linear feet.</i>			<i>Linear feet.</i>	<i>Linear feet.</i>		<i>Acres</i>
471	Unit cost—		\$1.00	\$3.50	\$3.50	\$20.00	\$40.00	\$1.00	\$1.50	\$40.00	\$600.00
	Perth Amboy, N. J.:—										
	Quantity.....		7,189	0	2,120	4	10	0	0	0	0
	Cost.....	\$400.00	\$7,189.00		\$7,370.00	\$80.00	\$400.00				
	Cost per family.....	\$2.56	\$46.08		\$47.24	\$0.51	\$2.57				
503	Philadelphia, Pa.:—										
	Navy Yard, Oregon Avenue—										
	Quantity.....	0	150,000	10,332	0	108	30	0	11,900	92	1.76
	Cost.....		\$150,000.00	\$36,162.00		\$2,160.00	\$120.00		\$17,850.00	\$3,680.00	\$1,056.00
	Cost per family.....		\$215.51	\$51.96		\$3.10	\$0.17		\$25.65	\$5.29	\$1.51
1536	Tacony—										
	Quantity.....	0	29,246	0	3,932	21	13	0	0	0	1.56
	Cost.....		\$29,246.00		\$13,712.00	\$420.00	\$520.00				\$936.00
	Cost per family.....		\$109.13		\$51.16	\$1.57	\$1.94				\$3.49
2125	Pompton Lakes, N. J.:—										
	Quantity.....	0	0	0	0	0	0	(1)	0	0	0
	Cost.....							\$375.00			
	Cost per family.....							\$25.00			
604	Portsmouth, N. H. (Kittery, Me.):—										
	Quantity.....	1.0	4,443	886	0	10	10	2,221	0	16	.00
	Cost.....	\$100.00	\$4,443.00	\$3,104.00		\$200.00	\$400.00	\$2,221.00		\$640.00	\$48.00
	Cost per family.....	\$1.56	\$69.42	\$48.81		\$3.13	\$6.25	\$34.70		\$10.00	\$0.75
2728	Portsmouth, Ohio (second site):—										
	Quantity.....	0	0	0	0	0	0	2,685	2,734	33	0
	Cost.....							\$2,685.00	\$4,101.00	\$1,320.00	
	Cost per family.....							\$13.93	\$21.36	\$6.87	
211	Puget Sd. Navy Yard (Bremerton), Wash., Inside:—										
	Quantity.....	0	0	0	0	0	0	0	0	0	0
	Cost.....										
	Cost per family.....										
62	Quincy, Mass.:—										
	Arnold Street—										
	Quantity.....	0	20,460	1,664	0	19	7	3,864	620	17	0
	Cost.....		\$20,460.00	\$3,824.00		\$380.00	\$280.00	\$3,864.00	\$930.00	\$640.00	
	Cost per family.....		\$161.10	\$45.85		\$2.99	\$2.29	\$30.42	\$7.32	\$5.33	
	Baker Yacht Basin—										
	Quantity.....	0	49,390	3,020	0	18	12	2,748	1,216	18	2.64
	Cost.....		\$19,390.00	\$10,576.00		\$260.00	\$480.00	\$2,748.00	\$1,824.00	\$720.00	\$1,584.00
	Cost per family.....		\$208.89	\$44.79		\$1.10	\$2.03	\$11.64	\$7.73	\$3.06	\$6.71
	River Street—										
	Quantity.....	0	5,401	872	0	7	1	2,700	0	13	0
	Cost.....		\$5,401.00	\$2,042.00		\$140.00	\$40.00	\$2,700.00		\$520.00	
	Cost per family.....		\$90.02	\$34.33		\$2.35	\$0.67	\$45.00		\$8.67	
246a	Rock Island District—										
	Davenport, Iowa—										
	King—										
	Quantity.....	0	4,667	0	0	0	0	3,825	0	18	0
	Cost.....		\$4,667.00					\$3,825.00		\$720.00	
	Cost per family.....		\$35.89					\$31.88		\$6.00	
	McManis—										
	Quantity.....	0	15,830	0	9,215	42	40	0	0	0	.71
	Cost.....		\$15,830.00		\$32,252.50	\$840.00	\$1,600.00				\$426.00
	Cost per family.....		\$59.29		\$120.80	\$3.15	\$7.99				\$1.59
	Park Lane—										
	Quantity.....	0	4,600	0	0	0	0	1,960	870	11	0
	Cost.....		\$4,600.00					\$1,960.00	\$1,305.00	\$440.00	
	Cost per family.....		\$50.55					\$21.54	\$14.34	\$4.84	
246b	Moline, Ill.—										
	Quantity.....	0	9,212	1,800	0	0	0	5,520	0	17	0
	Cost.....		\$9,212.00	\$6,300.00				\$5,520.00		\$680.00	
	Cost per family.....		\$78.73	\$33.85				\$47.18		\$5.81	
246b	East Moline, Ill.—										
	Deere—										
	Quantity.....	0	0	0	1,220	6	6	0	0	0	0
	Cost.....				\$4,270.00	\$120.00	\$240.00				
	Cost per family.....				\$158.15	\$1.14	\$8.88				
	Highlands—										
	Quantity.....	0	4,165	0	0	0	0	3,440	4,210	13	0
	Cost.....		\$4,165.00					\$3,440.00	\$6,315.00	\$520.00	
	Cost per family.....		\$42.07					\$34.55	\$63.79	\$5.25	
246c	Rock Island, Ill.—										
	Quantity.....	0	0	0	0	0	0	7,370	1,820	41	0
	Cost.....							\$7,370.00	\$2,730.00	\$1,640.00	
	Cost per family.....							\$33.96	\$12.58	\$7.56	
1368	Seven Pines, Va.:—										
	Quantity.....	32.8	33,490	0	40,900	70	90	0	0	0	35.66
	Cost.....	\$7,000.00	\$33,490.00		\$143,150.00	\$1,400.00	\$3,600.00				\$21,396.00
	Cost per family.....	\$8.11	\$78.90		\$165.88	\$1.62	\$4.17				\$24.79
138	Sharon, Pa.:—										
	Quantity.....	X	47,124	4,610	0	26	4	6,000	2,976	37	5.90
	Cost.....	\$500.00	\$45,424.00	\$16,135.00		\$520.00	\$160.00	\$6,000.00	\$4,464.00	\$1,480.00	\$3,540.00
	Cost per family.....	\$2.33	\$211.27	\$75.05		\$2.42	\$0.74	\$27.91	\$20.76	\$6.88	\$16.47
1535	South Bend, Ind.:—										
	Quantity.....	0	22,610	0	7,888	72	45	0	0	0	0
	Cost.....		\$22,610.00		\$26,704.00	\$1,440.00	\$1,800.00				
	Cost per family.....		\$121.56		\$148.41	\$7.74	\$9.57				
120	Staten Island, N. Y.:—										
	Apartments—										
	Quantity.....	0	100	0	0	0	0	0	320	1	.47
	Cost.....		\$100.00						\$40.00	\$40.00	\$28.01
	Cost per family.....		\$2.78						\$13.33	\$1.11	\$10.60
	Houses—										
	Quantity.....	X	8,830	0	0	0	0	2,139	0	10	0
	Cost.....	\$4,050.00	\$8,860.00					\$2,139.00		\$400.00	
	Cost per family.....	\$51.92	\$113.59					\$27.12		\$5.13	

1 5 cesspools.

2 Total cost for sewer, inlets, and manholes.

to project including previous improvements. Continued.

No.	Project.	Roadways			Alleys	Curbs.	Gutters	Sidewalks	Planting strips	Street trees.	Total.
		Class A.	Class B.	Class C.							
	Unit cost	Square yard \$3.00	Square yard \$2.00	Square yard \$1.00	Square yard \$2.00	Linear foot \$0.80	Linear foot \$0.50	Square yard \$2.00	Square yard \$0.25	\$6.00	
471	Perth Amboy, N. J.:										
	Quantity	0	0	5,351	2,619	2,825	2,825	1,243	2,289	104	
	Cost			\$5,351.00	\$5,238.00	\$2,260.00	\$1,413.00	\$2,486.00	\$572.00	\$624.00	\$33,383.00
	Cost per family			\$34.30	\$33.58	\$14.49	\$9.06	\$15.94	\$3.67	\$4.00	\$214.00
503	Philadelphia, Pa.: Navy yard, Oregon Avenue										
	Quantity	33,335	0	0	9,708	23,551	0	13,724	17,607	786	
	Cost	\$100,005.00			\$19,416.00	\$18,841.00		\$27,448.00	\$4,401.75	\$4,716.00	\$385,855.75
	Cost per family	\$143.68			\$27.88	\$27.01		\$39.43	\$6.32	\$6.77	\$554.28
1533	Tacoma:										
	Quantity	13,359	0	0	3,095	8,115	0	4,500	4,899	180	
	Cost	\$40,077.00			\$6,190.00	\$6,492.00		\$9,000.00	\$1,217.25	\$1,020.00	\$108,830.25
	Cost per family	\$149.54			\$23.10	\$24.22		\$33.58	\$4.54	\$3.81	\$106.08
2125	Pompton Lakes, N. J.:										
	Quantity	0	0	1,820	0	0	0	434	533	21	
	Cost			\$1,820.00				\$868.00	\$133.25	\$126.00	\$3,322.25
	Cost per family			\$121.33				\$57.87	\$8.88	\$8.40	\$221.48
604	Portsmouth, N. H. (Kittery, Me.):										
	Quantity	0	0	7,000	0	3,400	0	1,805	3,865	26	
	Cost			\$7,000.00		\$2,720.00		\$966.25	\$156.00	\$156.00	\$23,608.25
	Cost per family			\$100.37		\$42.50		\$56.40	\$15.09	\$2.43	\$400.41
2728	Portsmouth, Ohio (second site):										
	Quantity	0	16,614	0	0	9,240	0	5,160	7,975	200	
	Cost		\$33,228.00			\$7,392.00		\$10,320.00	\$1,993.75	\$1,200.00	\$62,239.75
	Cost per family		\$173.06			\$38.50		\$53.75	\$10.38	\$6.25	\$324.10
241	Puget Sound Navy Yard (Bremerton), Wash., Inside:										
	Quantity	0	25,501	0	6,290	18,431	124	10,081	24,553	367	
	Cost		\$51,002.00		\$12,580.00	\$14,744.80	\$62.00	\$20,162.00	\$6,138.25	\$2,202.00	\$139,389.67
	Cost per family		\$172.88		\$42.64	\$49.98	\$0.21	\$68.35	\$20.81	\$7.46	\$472.70
62	Quincy, Mass.: Arnold Street—										
	Quantity	0	9,941	0	0	1,040	0	3,193	5,649	174	
	Cost		\$19,882.00			\$832.00		\$6,386.00	\$1,412.25	\$1,044.00	\$61,974.25
	Cost per family		\$156.55			\$6.55		\$50.29	\$11.12	\$8.22	\$187.96
	Baker Yacht Basin—										
	Quantity	0	12,159	0	0	924	0	3,700	5,587	234	
	Cost		\$24,318.00			\$739.20		\$7,400.00	\$1,396.75	\$1,404.00	\$102,833.95
	Cost per family		\$193.40			\$3.13		\$31.36	\$5.92	\$5.95	\$435.71
	River Street—										
	Quantity	0	6,726	0	0	797	0	1,923	4,331	87	
	Cost		\$13,452.00			\$637.60		\$3,846.00	\$1,086.00	\$522.00	\$30,866.60
	Cost per family		\$224.20			\$10.63		\$64.10	\$18.10	\$8.70	\$506.55
246	Rock Island district: Davenport, Iowa—										
	King—										
	Quantity	0	5,129	0	2,213	6,648	0	3,164	7,343	120	
	Cost		\$10,258.00		\$4,426.00	\$5,318.40		\$6,386.00	\$1,835.75	\$720.00	\$38,098.15
	Cost per family		\$85.48		\$68.88	\$44.32		\$52.71	\$15.29	\$6.00	\$317.47
	McManus—										
	Quantity	10,064	15,770	0	6,000	5,650	0	8,478	23,717	238	
	Cost	\$30,192.00	\$31,540.00		\$12,000.00	\$1,520.00		\$16,076.00	\$5,929.25	\$1,148.00	\$153,513.75
	Cost per family	\$113.69	\$118.13		\$44.94	\$16.93		\$63.51	\$22.21	\$5.49	\$575.12
	Park Lane—										
	Quantity	0	7,758	0	1,924	5,186	0	2,822	8,848	91	
	Cost		\$15,516.00		\$3,848.00	\$4,148.80		\$5,644.00	\$2,212.00	\$536.00	\$40,219.80
	Cost per family		\$170.51		\$42.27	\$15.59		\$62.91	\$24.19	\$6.00	\$441.84
2464	Moline, Ill.—										
	Quantity	1,975	3,862	0	3,200	7,184	0	2,955	8,017	90	
	Cost	\$5,925.00	\$7,724.00		\$6,400.00	\$5,747.00		\$7,010.00	\$2,004.25	\$540.00	\$55,962.25
	Cost per family	\$50.64	\$66.02		\$54.70	\$49.12		\$30.51	\$17.13	\$4.61	\$478.30
2465	East Moline, Ill.—										
	Deere—										
	Quantity	0	0	1,317	444	1,175	0	511	1,440	27	
	Cost			\$1,317.00	\$888.00	\$940.00		\$1,022.00	\$360.00	\$162.00	\$9,319.00
	Cost per family			\$48.78	\$42.89	\$34.81		\$37.85	\$13.33	\$6.00	\$345.13
	Highlands—										
	Quantity	0	5,280	0	1,271	4,781	0	2,220	5,897	99	
	Cost		\$10,560.00		\$2,542.00	\$3,821.80		\$4,440.00	\$1,474.25	\$594.00	\$37,875.05
	Cost per family		\$106.67		\$25.68	\$38.59		\$44.85	\$14.57	\$6.00	\$382.32
2466	Rock Island, Ill.—										
	Quantity	0	18,306	0	3,215	12,174	0	2,158	14,301	180	
	Cost		\$36,612.00		\$6,430.00	\$9,739.20		\$4,316.00	\$3,575.25	\$1,080.00	\$73,492.45
	Cost per family		\$168.72		\$29.63	\$44.88		\$19.89	\$16.47	\$4.98	\$338.67
1368	Seven Pines, Va.:										
	Quantity	0	0	95,843	0	21,993	21,993	46,003	65,663	2,050	
	Cost			\$95,843.00		\$17,594.40	\$10,996.50	\$92,006.00	\$16,415.75	\$12,300.00	\$455,191.65
	Cost per family			\$111.06		\$20.39	\$12.74	\$106.61	\$19.02	\$14.26	\$527.55
138	Sharon, Pa.:										
	Quantity	0	27,887	0	0	17,436	0	7,778	19,136	294	
	Cost		\$55,774.00			\$13,948.80		\$15,556.00	\$4,784.00	\$1,764.00	\$170,049.80
	Cost per family		\$259.41			\$64.88		\$22.35	\$22.25	\$8.20	\$790.92
1535	South Bend, Ind.:										
	Quantity	0	37,250	0	7,125	14,175	14,175	7,775	12,666	260	
	Cost		\$74,500.00		\$14,250.00	\$11,340.00	\$7,087.50	\$15,550.00	\$3,166.50	\$1,560.00	\$180,008.00
	Cost per family		\$400.54		\$76.61	\$60.97	\$38.10	\$83.60	\$17.02	\$8.39	\$972.51
130	Staten Island, N. Y.:										
	Apartments—										
	Quantity	0	0	708	0	410	0	228	320	10	
	Cost			\$708.00		\$328.00		\$456.00	\$80.00	\$60.00	\$2,534.00
	Cost per family			\$19.67		\$9.11		\$12.68	\$2.22	\$1.67	\$73.18
	Houses—										
	Quantity	0	0	6,191	0	4,220	4,220	2,311	4,555	82.00	
	Cost			\$6,191.00		\$3,376.00	\$2,110.00	\$4,622.00	\$1,138.75	\$492.00	\$33,378.75
	Cost per family			\$79.37		\$43.28	\$27.05	\$59.26	\$14.60	\$6.31	\$427.93

TABLE VII.—General improvements directly chargeable

No.	Project.	Clearing.	Heavy grading.	Storm drains.	Combined sewers.	Inlets.	Manholes.	Sanitary sewers.			Public grounds development.
								8 inches.	Over 8 inches.	Manholes.	
	Unit cost.....	Acres.	Cubic yards.	Linear feet.	Linear feet.			Linear feet.	Linear feet.		Acres.
			\$1.00	\$3.50	\$3.50	\$20.00	\$40.00	\$1.00	\$1.50	\$40.00	\$600.00
118	Warren, Ohio.										
	Northeast										
	Quantity.....	0	825	270	0	3	1	983	0	5	.82
	Cost.....		\$825.00	\$945.00		\$60.00	\$40.00	\$980.00		\$200.00	\$492.00
	Cost per family.....		\$15.87	\$18.17		\$1.15	\$0.77	\$18.85		\$3.85	\$9.46
	Southeast										
	Quantity.....	0	876	880	0	5	4	0	1,760	4	0
	Cost.....		\$876.00	\$3,080.00		\$100.00	\$160.00		\$1,860.00	\$160.00	
	Cost per family.....		\$18.64	\$65.53		\$2.13	\$3.40		\$39.38	\$3.40	
	Washington, D. C., district:										
	Navy Yard—										
27a	Apartments										
	Quantity.....	0	83,800	1,200	2,250	22	17	0	0	0	2.14
	Cost.....		\$83,800.00	\$4,200.00	\$7,875.00	\$440.00	\$680.00				\$1,284.00
	Cost per family.....		\$272.08	\$13.64	\$25.57	\$1.43	\$2.21				\$4.17
27b	Houses—										
	Quantity.....	0	32,362	0	5,900	10	21	0	0	0	0
	Cost.....		\$32,362.00		\$20,650.00	\$200.00	\$840.00				
	Cost per family.....		\$118.18		\$75.36	\$0.73	\$3.07				
54c	Residence halls—										
	Twenty-first and B Streets—										
	Quantity.....	0	0	×	489	4	1	0	2,059	9	0
	Cost.....				\$1,711.50	\$80.00	\$10.00		\$3,088.50	\$360.00	
	Cost per family.....				\$5.09	\$0.21	\$0.11		\$9.19	\$1.08	
54f	Bureau of Standards—										
	Quantity.....	0	5,268	0	0	0	0	686	143	5	6
	Cost.....	\$136.50	\$5,268.00					\$686.00	\$214.50	\$200.00	
	Cost per family.....	\$1.34	\$51.65					\$6.72	\$2.10	\$1.96	
54g	South Capitol Street—										
	Quantity.....	0	0	0	3,120	7	12	0	0	0	.34
	Cost.....				\$10,920.00	\$140.00	\$480.00				\$304.00
	Cost per family.....				\$54.33	\$0.70	\$2.39				\$1.01
54h	Steel & Ordnance Co.										
	Quantity.....	0	10,700	0	0	0	0	0	2,838	8	0
	Cost.....	\$87.50	\$10,700.00						\$4,257.00	\$320.00	
	Cost per family.....	\$1.18	\$144.59						\$57.53	\$4.32	
38d	Waterbury, Conn.:—										
	Chase										
	Quantity.....	0	13,620	220	0	6	2	1,615	920	16	0
	Cost.....		\$13,620.00	\$770.00		\$120.00	\$80.00	\$1,615.00	\$1,380.00	\$640.00	
	Cost per family.....		\$194.57	\$11.00		\$1.71	\$1.14	\$23.67	\$19.71	\$9.14	
	Sylvan Avenue—										
	Quantity.....	0	18,406	1,883	0	12	8	3,679	0	18	0
	Cost.....		\$18,406.00	\$6,590.50		\$240.00	\$220.00	\$3,679.00		\$720.00	
	Cost per family.....		\$136.29	\$48.81		\$1.78	\$2.37	\$27.26		\$5.33	
38g	Watertown, N. Y.:—										
	Quantity.....	0	17,970	3,870	0	34	10	3,200	1,700	19	3.19
	Cost.....		\$17,970.00	\$13,545.00		\$680.00	\$400.00	\$3,200.00	\$2,550.00	\$760.00	\$1,914.00
	Cost per family.....		\$59.50	\$44.85		\$2.25	\$1.32	\$10.59	\$8.43	\$2.52	\$6.34
151	Watervliet (Troy), N. Y.:—										
	Quantity.....	0	2,900	0	0	0	0	1,709	0	6	0
	Cost.....		\$2,900.00					\$1,700.00		\$240.00	
	Cost per family.....		\$11.88					\$18.68		\$2.64	
	Total 97 sites, 21,005 families (where quantities are unknown, an average of all others is added).										
	Quantity.....		1,751,899	108,421	1,130,785	1,333	835	306,338	123,549	1,995	341.79
	Cost.....	\$47,747.00	\$1,751,899.00	\$379,473.50	\$490,307.50	\$26,660.00	\$33,400.00	\$329,363.00	\$185,323.50	\$79,800.00	\$205,074.00
	Cost per family.....	\$2.27	\$83.40	\$18.06	\$23.34	\$1.27	\$1.79	\$15.68	\$8.82	\$3.80	\$9.76

1 Quantity for Puget Sound not included.

2 Includes 322 cesspools.

to project (including previous improvements)—Continued.

No.	Project.	Roadways.			Alleys.	Curbs.	Gutters.	Sidewalks.	Planting strips.	Street trees.	Total.
		Class A.	Class B.	Class C.							
	Unit cost.....	Square yard. \$3.00	Square yard. \$2.00	Square yard. \$1.00	Square yard. \$2.00	Liner foot. \$0.80	Linear foot. \$0.50	Square yard. \$2.00	Square yard. \$0.25		
118	Warren, Ohio:									\$6.00	
	Northeast										
	Quantity.....	0	4,931	0	0	3,425	0	1,732	2,753	39	
	Cost.....		\$9,862.00			\$2,740.00		\$3,464.00	\$688.25	\$234.00	\$20,530.25
	Cost per family.....		\$189.65			\$52.69		\$66.62	\$13.24	\$4.50	\$394.82
	Southeast										
	Quantity.....	0	3,620	0	0	2,586	0	1,426	2,338	53	
	Cost.....		\$7,240.00			\$2,068.80		\$2,852.00	\$584.50	\$318.00	\$19,329.30
	Cost per family.....		\$154.04			\$44.02		\$60.68	\$12.44	\$6.77	\$693.64
	Washington, D. C., district:										
	Navy Yard—										
27a	Apartment—										
	Quantity.....	2,211	7,060	0	5,421	4,860	0	3,384	14,117	108	
	Cost.....	\$6,633.00	\$14,120.00		\$10,842.00	\$3,888.00		\$6,768.00	\$3,529.25	\$648.00	\$144,707.25
	Cost per family.....	\$21.54	\$45.84		\$35.20	\$12.62		\$21.97	\$11.46	\$2.10	\$469.83
27b	Houses—										
	Quantity.....	0	14,525	0	9,907	8,196	0	5,491	15,279	182	
	Cost.....		\$29,050.00		\$19,814.00	\$6,556.80		\$10,982.00	\$3,819.75	\$1,092.00	\$125,366.55
	Cost per family.....		\$106.02		\$72.31	\$23.93		\$40.08	\$13.94	\$3.99	\$457.61
	Residence halls—										
54c	Twenty-first and B Streets—										
	Quantity.....	0	4,866	0	1,328	2,756	0	3,536	828	0	
	Cost.....		\$9,732.00		\$2,656.00	\$2,204.80		\$7,072.00	\$207.00		\$27,151.30
	Cost per family.....		\$28.66		\$7.90	\$6.56		\$21.04	\$0.61		\$80.45
54f	Bureau of Standards—										
	Quantity.....	0	630	0	0	0	0	111	244	0	
	Cost.....		\$1,260.00					\$222.00	\$61.00		\$8,048.00
	Cost per family.....		\$12.35					\$2.18	\$0.60		\$78.90
54g	South Capitol Street—										
	Quantity.....	3,446	2,460	0	2,272	3,300	0	1,940	3,741	50	
	Cost.....	\$10,338.00			\$4,544.00	\$2,640.00		\$3,880.00	\$935.25	\$300.00	\$34,381.25
	Cost per family.....	\$51.43	\$24.47		\$22.70	\$13.13		\$19.30	\$4.65	\$1.49	\$195.60
549	Steel & Ordnance Co.—										
	Quantity.....	3,133	928	1,456	0	0	435	1,351	10,567	76	
	Cost.....	\$9,399.00	\$1,856.00	\$1,456.00			\$217.50	\$2,702.00	\$2,641.75	\$456.00	\$34,092.73
	Cost per family.....	\$127.01	\$25.08	\$19.68			\$2.94	\$279.76	\$35.70	\$6.16	\$703.95
380	Waterbury, Conn.:										
	Chase—										
	Quantity.....	0	0	5,360	0	120	4,248	2,493	3,012	105	
	Cost.....			\$5,360.00		\$96.00	\$2,124.00	\$4,986.00	\$753.00	\$630.00	\$32,174.00
	Cost per family.....			\$76.57		\$1.37	\$30.34	\$71.23	\$10.76	\$9.00	\$460.21
	Sylvan Avenue										
	Quantity.....	0	0	13,242	0	460	8,656	8,190	5,304	171	
	Cost.....			\$13,242.00		\$368.00	\$4,328.00	\$16,380.00	\$1,326.00	\$1,026.00	\$66,625.50
	Cost per family.....			\$98.09		\$2.72	\$32.06	\$121.34	\$9.82	\$7.60	\$493.47
389	Watertown, N. Y.:										
	Quantity.....	0	0	32,600	0	700	0	9,474	21,318	331	
	Cost.....			\$32,600.00		\$560.00		\$18,948.00	\$5,329.50	\$1,986.00	\$100,442.50
	Cost per family.....			\$107.95		\$1.85		\$62.71	\$17.71	\$6.58	\$332.63
151	Watervliet (Troy), N. Y.:										
	Quantity.....	0	11,611	0	0	5,368	0	2,270	17,270	64	
	Cost.....		\$23,222.00			\$4,204.40		\$4,540.00	\$4,317.50	\$384.00	\$41,597.90
	Cost per family.....		\$255.19			\$47.19		\$49.46	\$47.50	\$4.22	\$456.76
	Total, 97 sites, 21,005 families (where quantities are unknown, X, average of all others is added):										
	Quantity.....	125,301	627,187	782,030	122,410	528,014	141,934	555,192	1,174,648	23,330	
	Cost.....	\$375,903.00	\$1,254,371.00	\$782,030.00	\$244,820.00	\$422,412.00	\$70,967.00	\$1,168,863.00	\$293,662.00	\$139,980.00	\$8,282,058.50
	Cost per family.....	\$17.89	\$59.72	\$37.23	\$11.61	\$20.11	\$3.38	\$55.65	\$13.98	\$6.66	\$394.25



REPORT UNITED STATES HOUSING CORPORATION.

TABLE VIII.—General improvements within project, cost to be refunded by annual charges.

Unit costs are assumed for comparison only. See remarks introductory to these tables. On many projects where no gas mains are tabulated they were to be put in by private companies, but no plans were made. Quantities under "Electric wire" indicate total linear feet of wire, not of pole lines.
 Street lights are assumed to be 500-watt tungsten fixtures, though in a few cases are costing twice the amount per fixture were used to conform to local city practice.
 Underground conduits are not figured, as they were used by the United States Housing Corporation on only two projects, owing to the war-time prohibition on materials used in conduits.

No.	Project.	Water mains.		Hydrants.	Hydrant connections.	Valves.	Gas mains.	Electric wire.		Poles for wires.	Street lights.	Total.
		6-inch.	Over 6-inch.					House lighting.	Street lighting.			
		Lin. ft.	Lin. ft.		Lin. ft.		Lin. ft.	Lin. ft.	Lin. ft.			
56	Unit cost	\$0.90	\$2.00	\$40.00	\$1.00	\$20.00	\$1.50	\$0.04	\$0.04	\$30.00	\$20.00	
	Aberdeen, Md.:											
	Quantity.....	2,775	470	6	57	7	0	13,965	3,820	46	10	
	Cost.....	\$2,497.50	\$940.00	\$240.00	\$57.00	\$140.00		\$558.60	\$152.80	\$1,380.00	\$200.00	\$6,165.90
185	Cost per family.....	\$31.22	\$11.75	\$3.00	\$0.71	\$1.75		\$6.98	\$1.91	\$17.25	\$2.50	\$77.07
	Alabama nitrate district:											
	Florence—											
	Quantity.....	X	X	X	X	X	0	X	X	X	X	
	Cost.....											
597	Cost per family.....											
	Sheffield—											
	Quantity.....	X	X	X	X	X	0	X	X	X	X	
	Cost.....											
1165	Cost per family.....											
	Tusculum—											
	Quantity.....	X	X	X	X	X	0	X	X	X	X	
	Cost.....											
621	Cost per family.....											
	Alliance, Ohio:											
	Northwest—											
	Quantity.....	2,520	0	4	40	12	1,718	30,000	3,000	44	4	
	Cost.....	\$2,268.00		\$160.00	\$40.00	\$240.00	\$2,622.00	\$1,200.00	\$120.00	\$1,320.00	\$80.00	\$8,150.00
	Cost per family.....	\$43.62		\$3.08	\$0.77	\$4.62	\$50.42	\$23.08	\$2.31	\$25.00	\$1.54	\$154.44
	Southeast—											
	Quantity.....	2,944	4,192	19	288	45	8,646	88,000	9,600	134	21	
	Cost.....	\$2,649.60	\$8,384.00	\$760.00	\$288.00	\$900.00	\$12,969.00	\$3,520.00	\$384.00	\$4,020.00	\$420.00	\$34,294.60
554	Cost per family.....	\$27.34	\$39.31	\$3.56	\$1.35	\$4.22	\$60.88	\$16.52	\$1.80	\$18.92	\$1.97	\$175.87
	Alton, Ill.:											
	Broadway—											
	Quantity.....	705	0	X	X	X	0	X	X	X	X	
	Cost.....	\$34.50										
	Cost per family.....	\$28.84										\$634.50
	East Alton—											\$28.84
	Quantity.....	1,160	465	2	24	3	0	X	X	X	X	
	Cost.....	\$1,044.00	\$930.00	\$80.00	\$24.00	\$60.00						
	Cost per family.....	\$69.60	\$62.00	\$5.33	\$1.60	\$4.00						\$2,138.00
	Milton Hill—											\$142.53
	Quantity.....	8,325	2,580	21	288	22	X	X	44,700	113		
	Cost.....	\$7,492.50	\$5,160.00	\$960.00	\$288.00	\$440.00			\$1,788.00	\$3,300.00		\$19,518.50
59	Cost per family.....	\$29.90	\$18.17	\$3.38	\$1.01	\$1.55			\$6.30	\$11.94		\$72.25
	Bath, Me.:											
	Quantity.....	2,390	750	9	85	17	3,664	3,950	4,650	39	25	
	Cost.....	\$2,151.00	\$1,500.00	\$360.00	\$85.00	\$340.00	\$5,496.00	\$158.00	\$186.00	\$1,170.00	\$500.00	\$9,816.51
24	Cost per family.....	\$23.90	\$16.66	\$4.00	\$0.94	\$3.77	\$61.66	\$1.75	\$2.06	\$13.00	\$5.55	\$133.29
	Bethlehem, Pa.:											
	Quantity.....	22,000	14,000	73	1,100	119	X	327,500	63,300	404	90	
	Cost.....	\$19,800.00	\$28,000.00	\$2,920.00	\$1,100.00	\$2,380.00		\$13,100.00	\$2,532.00	\$12,120.00	\$1,800.00	\$83,752.00
	Cost per family.....	\$15.73	\$22.40	\$2.33	\$0.87	\$1.89		\$10.41	\$2.01	\$9.63	\$1.43	\$66.70
102	Bridgeport, Conn.:											
	Houses—Black Rock (1)											
	Quantity.....	0	2,190	8	80	10	1,080	800	600	8	4	
	Cost.....		\$4,380.00	\$320.00	\$80.00	\$200.00	\$1,620.00	\$32.00	\$24.00	\$240.00	\$80.00	\$6,976.00
	Cost per family.....		\$20.23	\$1.48	\$0.37	\$0.93	\$7.50	\$0.15	\$0.11	\$1.11	\$0.37	\$32.25
	Connecticut Avenue (14)—											
	Quantity.....	0	1,298	2	15	7	610	320	320	3	2	
	Cost.....		\$2,596.00	\$80.00	\$15.00	\$140.00	\$915.00	\$12.80	\$12.80	\$90.00	\$40.00	\$3,901.60
	Cost per family.....		\$24.04	\$0.75	\$0.14	\$1.30	\$8.47	\$0.12	\$0.12	\$0.83	\$0.37	\$36.14
	Crane (4)—											
	Quantity.....	0	4,420	8	39	20	5,720	3,600	3,000	30	9	
	Cost.....		\$8,840.00	\$320.00	\$39.00	\$400.00	\$8,580.00	\$144.00	\$120.00	\$900.00	\$180.00	\$19,523.00
	Cost per family.....		\$23.45	\$0.85	\$0.10	\$1.06	\$22.76	\$0.38	\$0.32	\$2.39	\$0.48	\$51.79
	Grasmere (12)—											
	Quantity.....	0	2,532	8	38	16	960	1,000	960	10	5	
	Cost.....		\$5,064.00	\$320.00	\$38.00	\$360.00	\$1,440.00	\$40.00	\$38.40	\$300.00	\$100.00	\$7,700.40
	Cost per family.....		\$50.14	\$3.17	\$0.38	\$3.56	\$14.26	\$0.39	\$0.38	\$2.97	\$0.99	\$76.24
	Mill Green (5)—											
	Quantity.....	688	3,440	7	69	9	3,472	1,200	1,180	14	7	
	Cost.....	\$619.20	\$6,880.00	\$280.00	\$69.00	\$180.00	\$5,208.00	\$48.00	\$47.20	\$420.00	\$140.00	\$13,891.40
	Cost per family.....	\$5.49	\$61.99	\$2.52	\$0.62	\$1.62	\$46.92	\$0.43	\$0.43	\$3.78	\$1.26	\$125.06
	Mill Green Cemetery Extension—											
	Quantity.....	0	2,660	7	74	11	1,800	1,500	800	17	6	
	Cost.....		\$5,320.00	\$280.00	\$74.00	\$220.00	\$2,400.00	\$60.00	\$32.00	\$510.00	\$120.00	\$9,016.00
102a	Cost per family.....		\$55.42	\$2.91	\$0.77	\$2.29	\$26.04	\$0.62	\$0.34	\$5.31	\$1.25	\$94.95
	Temporary flats—											
	Cemetery Site—											
	Quantity.....	0	1,075	4	40	5	1,550	1,200	1,000	9	4	
	Cost.....		\$2,150.00	\$160.00	\$40.00	\$100.00	\$2,325.00	\$48.00	\$40.00	\$270.00	\$80.00	\$5,213.00
	Cost per family.....		\$10.14	\$0.75	\$0.19	\$0.47	\$10.92	\$0.23	\$0.19	\$1.27	\$0.38	\$24.54
	Hill Top—											
	Quantity.....	0	800	4	40	5	810	800	800	8	2	
	Cost.....		\$1,600.00	\$160.00	\$40.00	\$100.00	\$1,215.00	\$32.00	\$32.00	\$240.00	\$40.00	\$3,459.03
	Cost per family.....		\$8.51	\$0.85	\$0.21	\$0.53	\$6.41	\$0.17	\$0.17	\$1.28	\$0.21	\$18.04

TABLE VIII.—General improvements within project, cost to be refunded by annual charges—Continued.

No.	Project.	Water mains		Hydrants	Hydrant connections.	Valves.	Gas mains.	Electric wire		Poles for wires.	Street lights.	Total.
		6-inch.	Over 6-inch.					House lighting.	Street lighting.			
	Unit cost	Lin. ft.	Lin. ft.		Lin. ft.		Lin. ft.	Lin. ft.	Lin. ft.			
		\$0.90	\$2.00	\$40.00	\$1.00	\$20.00	\$1.50	\$0.04	\$0.04	\$30.00	\$20.00	
456	Butler, Pa.:											
	Quantity.....	578	3,055	4	47	16	7,800		1,625	38	14	
	Cost.....	\$772.20	\$6,110.00	\$160.00	\$47.00	\$320.00	\$11,700.00		\$65.00	\$1,140.00	\$280.00	\$20,594.20
	Cost per family.....	\$16.24	\$36.58	\$0.96	\$0.28	\$1.92	\$70.06		\$0.39	\$6.71	\$1.68	\$164.82
565	Charleston, S. C.:											
	Quantity.....	7,164	1,390	16	192	19	0	0	0	0	0	
	Cost.....	\$6,147.60	\$2,780.00	\$640.00	\$192.00	\$380.00						\$10,439.60
	Cost per family.....	\$41.33	\$17.83	\$4.10	\$1.23	\$2.44						\$66.93
18	Charleston, W. Va.:											
	Quantity.....	4,280	120	12	216	10	4,000	17,000	5,000	34	9	
	Cost.....	\$3,852.00	\$240.00	\$480.00	\$216.00	\$200.00	\$6,000.00	\$680.00	\$200.00	\$1,020.00	\$180.00	\$13,068.00
	Cost per family.....	\$41.25	\$2.76	\$5.32	\$2.48	\$2.30	\$69.00	\$7.82	\$2.30	\$11.72	\$2.07	\$150.22
1635	Chester, Pa.:											
	Eddystone—											
	Quantity.....	9,178	4,542	24	180	7	11,560					
	Cost.....	\$8,260.20	\$9,084.00	\$960.00	\$180.00	\$140.00	\$17,340.00					\$35,964.20
	Cost per family.....	\$14.24	\$15.66	\$1.65	\$0.31	\$0.24	\$23.90					\$52.00
2947	Ridley Park—											
	Quantity.....						9,290					
	Cost.....						\$13,935.00					\$13,935.00
	Cost per family.....						\$24.84					\$24.84
213	Dayton, Ohio:											
	Edgemont—											
	Quantity.....	11,055	9,297	30	360	26	19,000	76,000	25,800	216	48	
	Cost.....	\$9,449.20	\$18,594.00	\$1,200.00	\$360.00	\$520.00	\$28,500.00	\$3,040.00	\$1,032.00	\$6,480.00	\$960.00	\$70,635.50
	Cost per family.....	\$12.64	\$23.50	\$1.33	\$0.46	\$0.66	\$36.22	\$4.86	\$1.31	\$8.23	\$1.22	\$89.63
	Leo Street—											
	Quantity.....	1,600	0	0	0	0	1,866	3,000	2,000	7	4	
	Cost.....	\$1,444.00					\$2,790.00	\$120.00	\$80.00	\$210.00	\$80.00	\$4,729.00
	Cost per family.....	\$36.10					\$70.00	\$3.00	\$2.00	\$5.25	\$2.00	\$118.25
244a	Elizabeth, N. J.:											
	Site A—											
	Quantity.....	630	750	4	50	6	1,160	8,000	2,400	12	5	
	Cost.....	\$567.00	\$1,500.00	\$160.00	\$50.00	\$120.00	\$1,740.00	\$320.00	\$96.00	\$80.00	\$100.00	\$5,513.00
	Cost per family.....	\$11.34	\$30.00	\$3.20	\$1.00	\$2.40	\$34.80	\$6.40	\$1.92	\$7.20	\$2.00	\$100.26
	Site B—											
	Quantity.....	1,280	0	4	50	6	1,300	9,700	4,250	20	5	
	Cost.....	\$1,152.00		\$160.00	\$50.00	\$120.00	\$1,950.00	\$388.00	\$170.00	\$600.00	\$100.00	\$4,690.00
	Cost per family.....	\$11.08		\$1.54	\$0.49	\$1.15	\$18.75	\$3.73	\$1.63	\$5.76	\$0.96	\$45.09
	Site D—											
	Quantity.....	880	0	3	30	5	890	11,000	5,500	25	3	
	Cost.....	\$792.00		\$120.00	\$30.00	\$100.00	\$1,335.00	\$400.00	\$220.00	\$750.00	\$60.00	\$3,847.90
	Cost per family.....	\$15.84		\$2.40	\$0.60	\$2.00	\$26.70	\$8.80	\$4.40	\$15.00	\$1.25	\$76.69
10	Erie, Pa.:											
	East—											
	Quantity.....	7,200	0	17	110	20	0	40,570	12,270	100	21	
	Cost.....	\$6,480.00		\$680.00	\$140.00	\$400.00		\$1,622.80	\$60.80	\$3,000.00	\$420.00	\$13,243.60
	Cost per family.....	\$29.66		\$3.05	\$0.63	\$1.75		\$7.28	\$2.20	\$13.45	\$1.89	\$59.91
	West—											
	Quantity.....	13,550	1,080	24	170	35	0	92,000	17,675	214	33	
	Cost.....	\$12,195.00	\$2,160.00	\$960.00	\$170.00	\$700.00		\$3,680.00	\$707.00	\$6,420.00	\$860.00	\$27,632.00
	Cost per family.....	\$24.44	\$4.33	\$1.92	\$0.30	\$1.40		\$7.37	\$1.42	\$12.87	\$1.32	\$55.37
457	Hammond, Ind.:											
	Quantity.....	6,670	2,400	10	100	15	0	27,900	11,600	70	18	
	Cost.....	\$5,985.00	\$4,800.00	\$400.00	\$100.00	\$300.00		\$1,116.00	\$64.00	\$2,100.00	\$360.00	\$15,625.00
	Cost per family.....	\$34.41	\$27.59	\$2.29	\$0.57	\$1.78		\$6.41	\$2.67	\$12.28	\$2.07	\$90.00
578	Ilion, N. Y.:											
	Quantity.....	5,095	0	10	120	15	4,827		4,300	37	11	
	Cost.....	\$4,585.50		\$400.00	\$120.00	\$300.00	\$7,240.70		\$172.00	\$1,110.00	\$220.00	\$14,148.00
	Cost per family.....	\$29.78		\$2.60	\$0.78	\$1.95	\$17.02		\$1.12	\$7.21	\$1.44	\$91.90
1314	Indianapolis, Ind.:											
	Quantity.....	300	0	2	20	2	0	2,790	1,100	17	6	
	Cost.....	\$270.00		\$80.00	\$20.00	\$40.00		\$111.00	\$44.00	\$510.00	\$120.00	\$1,195.60
	Cost per family.....	\$5.63		\$1.68	\$0.42	\$0.84		\$2.33	\$0.92	\$10.63	\$2.50	\$24.95
496	Indian Head, Md.:											
	Quantity.....	20,968	0	31		28	0					
	Cost.....	\$18,871.20		\$1,240.00		\$560.00						\$20,671.20
	Cost per family.....	\$99.32		\$6.53		\$2.95						\$108.80
607	Kenilworth, N. J., Site E:											
	Quantity.....	1,428	0	0	0	0	0	0	0	0	0	
	Cost.....	\$1,285.20										\$1,285.20
	Cost per family.....	\$24.72										\$24.72
398a	Lowell, Mass.: Houses											
	High Street Extension—											
	Quantity.....	1,931	2,410	5	60	5	2,000	8,400	6,280	31	13	
	Cost.....	\$1,737.90	\$2,820.00	\$200.00	\$60.00	\$100.00	\$3,000.00	\$336.00	\$251.20	\$930.00	\$260.00	\$9,093.10
	Cost per family.....	\$20.44	\$33.18	\$2.47	\$0.71	\$1.18	\$35.29	\$3.93	\$2.96	\$10.94	\$3.06	\$114.16
	Livingston—											
	Quantity.....	1,100	2,000	8	96	12	2,280	6,720	3,480	32	9	
	Cost.....	\$990.00	\$4,000.00	\$320.00	\$96.00	\$240.00	\$3,420.00	\$268.80	\$139.20	\$960.00	\$180.00	\$10,614.00
	Cost per family.....	\$24.72	\$100.00	\$8.00	\$2.40	\$6.00	\$55.50	\$6.72	\$3.48	\$24.00	\$4.50	\$265.32
2972	Lyles (Wrigley), Tenn.:											
	Quantity.....	6,645	660	14	230	17	0	15,020	10,490	101	20	
	Cost.....	\$5,980.50	\$1,320.00	\$560.00	\$230.00	\$340.00		\$600.80	\$419.60	\$3,030.00	\$400.00	\$12,880.80
	Cost per family.....	\$54.37	\$12.00	\$5.09	\$2.09	\$3.09		\$5.46	\$3.81	\$27.54	\$3.63	\$117.01
	Colored—											
	Quantity.....	676	0	0	0	0	0	1,864	1,416	7	2	
	Cost.....	\$608.40						\$74.56	\$56.64	\$210.00	\$40.00	\$989.58
	Cost per family.....	\$40.56						\$4.97	\$3.64	\$14.00	\$2.67	\$65.84
581	Mare Island (Vallejo), Calif.:											
	Houses:											
	Quantity.....	4,960	7,102	22	202	72	12,218	21,749	12,740	64	68	
	Cost.....	\$4,464.00	\$14,204.00	\$880.00	\$202.00	\$1,440.00	\$18,327.00	\$869.96	\$509.60	\$1,920.00	\$1,360.00	\$4,176.56
	Cost per family.....	\$10.66	\$33.92	\$2.10	\$0.48	\$3.44	\$43.74	\$2.08	\$1.22	\$4.58	\$3.25	\$105.47

TABLE VIII. *General improvements within project, cost to be refunded by annual charges—Continued.*

No.	Project.	Water mains.		Hydrants.	Hydrant connections.	Valves.	Gas mains.	Electric wire.		Poles for wires.	Street lights.	Total.
		6-inch.	Over 6-inch.					House lighting.	Street lighting.			
	Unit cost	Lin. ft.	Lin. ft.		Lin. ft.		Lin. ft.	Lin. ft.	Lin. ft.			
381	Milton, Pa.: Hepburn Street Quantity..... Cost..... Cost per family..... Site B— Quantity..... Cost..... Cost per family.....	\$0.90 710 \$639.00 \$26.63	\$2.00 0 0	\$40.00 1 \$40.00 \$1.67	15 1 \$15.00 \$0.62	\$20.00 1 \$20.00 \$0.84	\$1.50 385 \$577.50 \$24.66	\$0.04 X X	\$0.04 X X	\$30.00 X X	\$20.00 X X	..... \$1,291.50 \$54.42
997	Muskegon, Mich.: McGraft— Quantity..... Cost..... Cost per family..... Schoenberg— Quantity..... Cost..... Cost per family.....	..... 7,200 \$6,480.00 \$26.13	..... 0 0	..... 19 \$760.00 \$3.07	..... 204 \$204.00 \$0.82	..... 36 \$720.00 \$2.90	..... X X	..... 22,300 \$892.00 \$3.59	..... 28,500 \$1,140.00 \$4.51	..... 112 \$3,360.00 \$13.60	..... 15 \$300.00 \$1.21	..... \$13,856.00 \$55.83
880	Neville Island, Pa., Coraopolis: Quantity..... Cost..... Cost per family.....	3,170 \$2,853.00 \$98.04	0	9 \$360.00 \$4.80	100 \$100.00 \$1.43	12 \$240.00 \$3.20	2,800 \$4,200.00 \$56.00	16,000 \$640.00 \$8.53	7,480 \$299.20 \$3.99	30 \$900.00 \$12.00	9 \$180.00 \$2.10	\$9,772.20 \$130.39
271	New Brunswick, N. J.: Quantity..... Cost..... Cost per family.....	5,800 \$5,220.00 \$13.15	5,235 \$10,170.00 \$26.37	23 \$920.00 \$2.92	228 \$228.00 \$0.57	50 \$1,000.00 \$2.52	10,331 \$15,496.50 \$39.63	13,865 \$554.60 \$1.40	14,428 \$577.12 \$1.45	172 \$5,160.00 \$13.00	52 \$1,040.00 \$2.62	\$10,666.22 \$103.08
1371	New Castle, Del.: Quantity..... Cost..... Cost per family.....	6,575 \$5,917.50 \$128.64	0	20 \$800.00 \$17.39	240 \$240.00 \$5.22	17 \$340.00 \$7.39	670 \$1,005.00 \$21.85	0	4,000 \$160.00 \$3.48	40 \$1,200.00 \$26.69	15 \$300.00 \$6.67	\$9,962.50 \$217.33
157	New London, Conn.: Quantity..... Cost..... Cost per family..... Groton— Quantity..... Cost..... Cost per family.....	2,834 \$2,550.60 \$15.65	1,238 \$2,476.00 \$15.19	14 \$560.00 \$5.41	159 \$159.00 \$0.98	49 \$980.00 \$6.02	..... ..... .....	3,900 \$156.00 \$0.96	4,950 \$198.00 \$1.21	54 \$1,620.00 \$9.94	14 \$280.00 \$1.72	\$8,979.60 \$55.11
722	New Orleans, La.: Quantity..... Cost..... Cost per family.....	1,430 \$1,287.00 \$54.18	0	X	X	X ..... .....	..... ..... .....	..... ..... .....	X	X	X	\$1,287.00 \$51.48
382	Newport, R. I.: Quantity..... Cost..... Cost per family..... Jamestown— Quantity..... Cost..... Cost per family.....	5,560 \$7,704.00 \$36.86	4,815 \$9,630.00 \$16.08	23 \$920.00 \$4.40	270 \$270.00 \$1.29	17 \$340.00 \$1.63	0 ..... .....	..... ..... .....	..... ..... .....	X	X	\$18,364.00 \$90.26
57a	Newport News, Va.: Hilton Extension Quantity..... Cost..... Cost per family.....	2,510 \$2,259.00 \$24.22	0	3 \$120.00 \$1.76	60 \$60.00 \$0.88	5 \$100.00 \$1.47	2,440 \$3,660.00 \$51.82	3,200 \$128.00 \$1.88	1,600 \$64.00 \$0.94	22 \$660.00 \$9.71	3 \$60.00 \$0.88	\$7,111.00 \$104.56
57c	Briarfield— Quantity..... Cost..... Cost per family.....	910 \$819.00 \$81.90	0	1 \$40.00 \$1.00	20 \$20.00 \$2.00	4 \$80.00 \$8.00	X	X	X	X	X	\$859.00 \$95.90
57a	Briarfield— Quantity..... Cost..... Cost per family.....	1,300 \$1,870.00 \$7.99	1,500 \$3,000.00 \$6.19	28 \$1,120.00 \$2.51	280 \$280.00 \$0.58	10 \$800.00 \$1.65	X ..... .....	..... ..... .....	..... ..... .....	X ..... .....	..... ..... .....	\$9,070.00 \$18.72
404	Niagara Falls, N. Y.: Site A— Quantity..... Cost..... Cost per family..... Site B— Quantity..... Cost..... Cost per family..... Site C— Quantity..... Cost..... Cost per family.....	2,300 \$2,070.00 \$4.58	13,510 \$27,020.00 \$19.13	20 \$800.00 \$1.46	300 \$300.00 \$0.55	32 \$640.00 \$1.16	15,910 \$13,815.00 \$25.12	X	X	X	X	\$44,645.00 \$81.00
481	Niles, Ohio: Quantity..... Cost..... Cost per family..... Norfolk district: Craddock, Va.— Quantity..... Cost..... Cost per family..... Glenwood Park, Va.— Quantity..... Cost..... Cost per family.....	1,870 \$1,781.00 \$22.96	0	10 \$400.00 \$3.01	60 \$30.00 \$0.45	18 \$360.00 \$2.68	0	4,300 \$172.00 \$1.29	0	34 \$1,020.00 \$7.67	7 \$140.00 \$1.06	\$6,535.00 \$49.12
150b	Truxtun, Va.: Quantity..... Cost..... Cost per family.....	3,090 \$2,781.00 \$13.91	2,350 \$4,700.00 \$23.50	8 \$320.00 \$1.60	50 \$50.00 \$0.25	23 \$460.00 \$2.30	9,640 \$4,820.00 \$24.10	5,600 \$224.00 \$1.12	5,600 \$224.00 \$1.12	43 \$1,290.00 \$6.45	9 \$180.00 \$0.90	\$15,049.00 \$75.25
60	Pensacola, Fla.: Quantity..... Cost..... Cost per family.....	2,130 \$1,917.00 \$28.19	0	4 \$160.00 \$2.26	30 \$30.00 \$0.44	11 \$220.00 \$3.23	0	2,350 \$94.00 \$1.39	2,000 \$80.00 \$1.18	20 \$600.00 \$8.82	4 \$80.00 \$1.18	\$3,181.00 \$46.79
150c	Truxtun, Va.: Quantity..... Cost..... Cost per family.....	4,620 \$4,158.00 \$57.47	3,470 \$6,940.00 \$20.88	12 \$480.00 \$4.21	150 \$150.00 \$1.32	16 \$320.00 \$2.81	0	36,000 \$1,440.00 \$12.63	14,500 \$580.00 \$5.09	83 \$2,490.00 \$21.84	24 \$480.00 \$4.21	\$17,038.00 \$149.46
150b	Glenwood Park, Va.: Quantity..... Cost..... Cost per family.....	36,160 \$32,822.40 \$26.62	18,214 \$36,428.00 \$20.54	109 \$1,260.00 \$1.54	1,417 \$1,417.00 \$1.14	220 \$4,400.00 \$3.57	93,944 \$80,916.00 \$95.62	34,200 \$1,368.00 \$1.11	108,000 \$4,320.00 \$3.54	933 \$27,990.00 \$22.70	228 \$1,560.00 \$4.70	\$198,581.10 \$161.08
150c	Truxtun, Va.: Quantity..... Cost..... Cost per family.....	12,953 \$11,672.70 \$17.83	4,992 \$8,984.00 \$12.35	37 \$1,430.00 \$2.29	437 \$437.00 \$0.67	57 \$1,140.00 \$1.76	18,298 \$27,447.00 \$42.36	34,638 \$1,825.82 \$2.82	12,571 \$502.84 \$0.78	285 \$8,550.00 \$13.19	71 \$1,420.00 \$2.19	\$62,463.86 \$96.24
60	Pensacola, Fla.: Quantity..... Cost..... Cost per family.....	5,892 \$5,301.80 \$20.96	3,348 \$6,696.00 \$26.47	22 \$880.00 \$3.44	400 \$100.00 \$1.58	30 \$600.00 \$2.37	21,580 \$32,370.00 \$127.95	68,600 \$2,744.00 \$10.85	13,900 \$556.00 \$2.19	211 \$6,330.00 \$25.02	40 \$800.00 \$3.16	\$56,677.80 \$223.99
60	Pensacola, Fla.: Quantity..... Cost..... Cost per family.....	5,470 \$1,923.40 \$36.47	2,635 \$5,270.00 \$39.04	..... \$800.00 \$25.92	480 \$480.00 \$3.56	53 \$1,060.00 \$7.86	0	13,500 \$519.00 \$4.00	30,950 \$1,238.00 \$9.17	100 \$3,000.00 \$22.22	25 \$500.00 \$3.71	\$17,811.00 \$131.95

TABLE VIII.—General improvements within project, cost to be refunded by annual charges—Continued.

No.	Project.	Water mains.		Hydrants.	Hydrant connections.	Valves.	Gas mains.	Electric wire.		Poles for wires.	Street lights.	Total.
		6-inch.	Over 6-inch.					House lighting.	Street lighting.			
		Lin. ft.	Lin. ft.		Lin. ft.		Lin. ft.	Lin. ft.	Lin. ft.			
471	Unit cost	\$0.90	\$2.00	\$40.00	\$1.00	\$20.00	\$1.50	\$0.4	\$0.04	\$30.00	\$20.00	
	Perth Amboy, N. J.:											
	Quantity.....	1,902	0	6	60	7	0	0	0	0	0	
	Cost.....	\$1,711.80		\$240.00	\$60.00	\$140.00						\$2,151.80
	Cost per family.....	\$10.97		\$1.53	\$0.38	\$0.89						\$13.77
503	Philadelphia, Pa.:											
	Navy yard, Oregon Avenue—											
	Quantity.....	5,446	5,888	11	180	49	11,000	60,000	6,000	35	6	
	Cost.....	\$4,901.40	\$11,775.00	\$440.00	\$180.00	\$980.00	\$16,500.00	\$2,400.00	\$240.00	\$1,050.00	\$120.00	\$38,587.40
	Cost per family.....	\$7.04	\$16.88	\$0.63	\$0.26	\$1.41	\$23.71	\$3.45	\$0.35	\$1.52	\$0.17	\$55.42
1536	Tacony—											
	Quantity.....	290	4,089	11	164	18	0	×	×	×	×	
	Cost.....	\$261.00	\$8,198.00	\$440.00	\$164.00	\$360.00						\$9,423.00
	Cost per family.....	\$0.97	\$30.59	\$1.64	\$0.61	\$1.34						\$35.15
2125	Pompton Lakes, N. J.:											
	Quantity.....	484	0	2	32	2	×	×	×	×	×	
	Cost.....	\$435.60		\$80.00	\$32.00	\$40.00						\$587.60
	Cost per family.....	\$29.04		\$5.33	\$2.13	\$2.67						\$39.17
604	Portsmouth, N. H. (Kittery, Me.):											
	Quantity.....	2,067	0	×	×	×	×	×	×	×	×	
	Cost.....	\$1,860.30										\$1,860.30
	Cost per family.....	\$29.07										\$29.07
2728	Portsmouth, Ohio (second site):											
	Quantity.....	5,304	1,929	10	88	12	×	×	×	×	×	
	Cost.....	\$4,773.60	\$3,858.00	\$400.00	\$88.00	\$240.00						\$9,359.60
	Cost per family.....	\$24.86	\$20.09	\$2.09	\$0.46	\$1.25						\$48.75
241	Puget Sound Navy Yard (Bremerton) Wash., Inside:											
	Quantity.....	(1)	×	×	×	×	0	0	0	0	0	
	Cost.....	\$25,500.00										\$25,500.00
	Cost per family.....	\$86.44										\$86.44
62	Quincy, Mass.:											
	Arnold Street—											
	Quantity.....	3,572	940	12	124	14	4,510	×	4,192	45	17	
	Cost.....	\$3,214.80	\$1,880.00	\$480.00	\$124.00	\$280.00	\$6,765.00		\$167.68	\$1,350.00	\$340.00	\$14,601.48
	Cost per family.....	\$25.31	\$14.80	\$3.86	\$0.98	\$2.20	\$53.27		\$1.32	\$10.63	\$2.68	\$115.05
	Baker Yacht Basin:											
	Quantity.....	3,724	640	11	98	9	4,150	×	3,802	40	22	
	Cost.....	\$3,351.60	\$1,280.00	\$440.00	\$98.00	\$180.00	\$6,225.00		\$132.08	\$1,200.00	\$440.00	\$13,366.68
	Cost per family.....	\$14.20	\$5.42	\$1.87	\$0.42	\$0.76	\$26.38		\$0.64	\$5.09	\$1.87	\$56.65
	River Street—											
	Quantity.....	2,256	756	7	82	15	4,416	×	2,864	30	9	
	Cost.....	\$2,029.40	\$1,512.00	\$280.00	\$82.00	\$300.00	\$6,624.00		\$114.56	\$900.00	\$180.00	\$12,021.46
	Cost per family.....	\$33.82	\$25.20	\$4.67	\$1.37	\$5.00	\$110.40		\$1.91	\$15.00	\$3.00	\$200.37
246c	Rock Island district:											
	Davenport, Iowa—											
	King—											
	Quantity.....	3,850	680	9	110	5	0	26,560	7,040	41	7	
	Cost.....	\$3,465.00	\$1,360.00	\$340.00	\$110.00	\$100.00		\$1,062.40	\$281.00	\$1,320.00	\$140.00	\$8,199.00
	Cost per family.....	\$28.88	\$11.33	\$3.00	\$0.92	\$0.83		\$8.85	\$2.35	\$11.00	\$1.17	\$68.33
	McManus—											
	Quantity.....	6,600	\$1,820	17	240	11	0	48,300	16,000	120	17	
	Cost.....	\$5,940.00	\$1,640.00	\$680.00	\$240.00	\$220.00		\$1,932.00	\$640.00	\$3,600.00	\$340.00	\$17,232.00
	Cost per family.....	\$22.25	\$13.63	\$2.54	\$0.90	\$0.82		\$7.24	\$2.39	\$13.49	\$1.28	\$64.54
	Park Lane—											
	Quantity.....	3,160	550	8	100	5	0	25,240	7,280	58	8	
	Cost.....	\$2,844.00	\$1,100.00	\$320.00	\$100.00	\$100.00		\$1,009.60	\$291.20	\$1,740.00	\$100.00	\$7,664.80
	Cost per family.....	\$31.25	\$12.09	\$3.52	\$1.10	\$1.10		\$11.09	\$3.20	\$19.12	\$1.75	\$84.22
246a	Moline, Ill.—											
	Quantity.....	5,800	624	13	140	8	0	28,900	7,200	93	12	
	Cost.....	\$5,220.00	\$1,248.00	\$520.00	\$140.00	\$160.00		\$1,156.00	\$288.00	\$2,790.00	\$210.00	\$11,752.00
	Cost per family.....	\$44.62	\$10.67	\$4.11	\$1.37	\$1.37		\$9.88	\$2.46	\$23.85	\$2.05	\$100.71
246b	East Moline, Ill.—											
	Deere —											
	Quantity.....	1,600	330	6	70	8	1,600	13,500	6,100	30	6	
	Cost.....	\$1,440.00	\$660.00	\$240.00	\$70.00	\$100.00	\$2,400.00	\$540.00	\$244.00	\$900.00	\$120.00	\$6,774.00
	Cost per family.....	\$53.33	\$24.44	\$8.88	\$2.59	\$5.92	\$88.88	\$20.00	\$9.04	\$33.33	\$4.44	\$250.85
	Highlands —											
	Quantity.....	4,320	0	8	150	5	0	30,200	5,760	74	10	
	Cost.....	\$3,888.00		\$320.00	\$150.00	\$100.00		\$1,208.00	\$240.40	\$2,240.00	\$200.00	\$8,336.40
	Cost per family.....	\$89.28		\$3.23	\$1.52	\$1.01		\$12.20	\$2.33	\$22.43	\$2.02	\$84.22
246c	Rock Island, Ill.—											
	Quantity.....	7,670	1,450	21	252	15	0	56,020	9,200	123	25	
	Cost.....	\$6,903.00	\$2,900.00	\$840.00	\$252.00	\$300.00		\$2,240.80	\$368.00	\$3,690.00	\$500.00	\$17,993.80
	Cost per family.....	\$31.81	\$13.34	\$3.87	\$1.16	\$1.38		\$10.33	\$1.70	\$17.00	\$2.30	\$82.89
1368	Seven Pines, Va.:											
	Quantity.....	30,000	8,000	10	500	90	×	×	×	×	×	
	Cost.....	\$27,000.00	\$16,000.00	\$1,600.00	\$500.00	\$1,800.00						\$40,900.00
	Cost per family.....	\$31.29	\$18.54	\$1.85	\$0.58	\$2.08						\$54.34
138	Sharon, Pa.:											
	Quantity.....	8,320	1,935	16	188	18	0	×	×	×	×	
	Cost.....	\$7,488.00	\$3,960.00	\$640.00	\$188.00	\$360.00						\$12,636.00
	Cost per family.....	\$34.83	\$18.42	\$2.98	\$1.14	\$1.68						\$59.05
1535	South Bend, Ind.:											
	Quantity.....	6,360	1,120	16	256	8	6,182	0	8,560	85	13	
	Cost.....	\$5,724.00	\$2,240.00	\$640.00	\$256.00	\$160.00	\$9,273.00		\$342.40	\$2,550.00	\$260.00	\$21,445.40
	Cost per family.....	\$30.76	\$12.43	\$3.44	\$1.38	\$0.86	\$49.74		\$1.81	\$13.71	\$1.39	\$115.55
130	Staten Island, N. Y.:											
	Apartments—											
	Quantity.....	304	0	1	24	0		×	232		3	
	Cost.....	\$273.60		\$40.00	\$24.00				\$0.28		\$60.00	\$406.88
	Cost per family.....	\$7.60		\$1.11	\$0.67				\$0.26		\$1.67	\$11.31
	Houses—											
	Quantity.....	0	1,744	7	39	10	3,012	2,815	2,112	22	14	
	Cost.....		\$3,488.00	\$280.00	\$39.00	\$200.00	\$4,518.00	\$112.60	\$84.48	\$60.00	\$280.00	\$9,662.08
	Cost per family.....		\$44.72	\$3.59	\$0.51	\$2.57	\$57.93	\$1.14	\$1.03	\$8.46	\$3.59	\$123.849

* Includes all water pipe and fixtures.

REPORT UNITED STATES HOUSING CORPORATION.

TABLE VIII.—General improvements within project, cost to be refunded by annual charges—Continued.

No.	Project.	Water mains.		Hydrants.	Hydrant connections.	Valves.	Electric wire.			Poles for wires.	Street lights.	Total.
		6-inch	Over 6-inch.				Gas mains.	House lighting.	Street lighting.			
		Lin. ft.	Lin. ft.		Lin. ft.		Lin. ft.	Lin. ft.	Lin. ft.			
118	Warren, Ohio	\$0.90	\$2.00	\$40.00	\$1.00	\$20.00	\$1.50	\$0.04	\$0.04	\$30.00	\$20.00	.....
	Northeast—											
	Quantity.....	1,616	0	4	48	2	×	×	×	×	×	
	Cost.....	\$1,454.40		\$160.00	\$48.00	\$40.00						\$1,702.40
	Cost per family.....	\$27.97		\$3.08	\$0.92	\$0.77						\$32.74
	Southeast—											
	Quantity.....	1,320	0	3	36	2	1,268	0	1,144	13	5	
	Cost.....	\$1,188.00		\$120.00	\$36.00	\$40.00	\$1,902.00		\$45.76	\$390.00	\$100.00	\$3,821.76
	Cost per family.....	\$25.25		\$2.55	\$0.77	\$0.85	\$40.62		\$0.97	\$8.30	\$2.13	\$81.44
	Washington, D. C., district—											
27a	Navy yard—											
	Apartment—											
	Quantity.....	600	3,240	8	160	20	2,700	0	0	0	0	
	Cost.....	\$540.00	\$6,460.00	\$320.00	\$160.00	\$400.00	\$4,050.00					\$11,930.00
	Cost per family.....	\$0.18	\$20.97	\$1.04	\$0.52	\$1.30	\$13.15					\$37.16
27b	Houses—											
	Quantity.....	1,740	4,130	8	160	16	3,830	0	0	0	0	
	Cost.....	\$1,566.00	\$8,860.00	\$320.00	\$160.00	\$320.00	\$5,715.00					\$16,971.00
	Cost per family.....	\$5.72	\$32.66	\$1.17	\$0.58	\$1.17	\$20.97					\$62.27
	Residence Halls—											
54c	Twenty-first and B											
	Streets—											
	Quantity.....	1,344	1,664	5	102	10	0	2,429	×	×	48	
	Cost.....	\$1,209.60	\$3,328.00	\$200.00	\$102.00	\$200.00		\$97.16			\$960.00	\$6,096.76
	Cost per family.....	\$3.60	\$9.90	\$0.60	\$0.30	\$0.60		\$0.29			\$2.50	\$18.09
54f	Bureau of Standards—											
	Quantity.....	611	223	2	0	2	0	0	0	0	0	
	Cost.....	\$549.90	\$446.00	\$80.00		\$40.00						\$1,115.90
	Cost per family.....	\$5.39	\$4.37	\$0.78		\$0.39						\$10.93
54g	South Capitol Street—											
	Quantity.....	3,320	0	6	90	6	3,100	0	0	0	0	
	Cost.....	\$2,988.00		\$240.00	\$90.00	\$120.00	\$4,650.00					\$8,088.00
	Cost per family.....	\$14.87		\$1.19	\$0.45	\$0.60	\$23.13					\$40.24
54h	Steel & Ordnance Co.—											
	Quantity.....	2,420	970	5	50	8	0	0	0	0	0	
	Cost.....	\$2,178.00	\$1,940.00	\$200.00	\$50.00	\$160.00						\$4,528.00
	Cost per family.....	\$29.43	\$26.22	\$2.70	\$0.67	\$2.16						\$61.18
380	Waterbury, Conn.:—											
	Chase—											
	Quantity.....	1,752	925	5	50	3	0	0	0	0	0	
	Cost.....	\$1,576.80	\$1,850.00	\$200.00	\$50.00	\$60.00						\$3,736.80
	Cost per family.....	\$22.53	\$26.43	\$2.86	\$0.71	\$0.86						\$53.39
	Sylvan Avenue—											
	Quantity.....	561	2,570	5	61	10	0	0	0	0	0	
	Cost.....	\$504.90	\$5,140.00	\$200.00	\$61.00	\$220.00						\$6,125.90
	Cost per family.....	\$3.74	\$38.07	\$1.46	\$0.45	\$1.63						\$45.35
389	Watertown, N. Y.:—											
	Quantity.....	8,600	0	14	200	22	11,800	0	0	0	0	
	Cost.....	\$7,740.00		\$560.00	\$200.00	\$440.00	\$17,700.00					\$26,640.00
	Cost per family.....	\$25.63		\$1.85	\$0.66	\$1.45	\$58.61					\$88.20
151	Watervliet (Troy), N. Y.:—											
	Quantity.....	3,120	0	5	105	10	3,200	3,600	3,600	24	5	
	Cost.....	\$2,808.00		\$200.00	\$105.00	\$200.00	\$4,800.00	\$144.00	\$144.00	\$720.00	\$100.00	\$9,221.00
	Cost per family.....	\$30.86		\$2.20	\$1.15	\$2.20	\$52.75	\$1.58	\$1.58	\$7.91	\$1.10	\$101.33
	Total 97 sites, 21,005 families (where quantities are unknown, average of all others is added):											
	Quantity.....	422,907	190,222	1,171	14,229	1,786	420,290	1,880,975	796,525	6,411	1,556	
	Cost.....	\$406,116.30	\$380,144.00	\$46,840.00	\$14,229.00	\$35,720.00	\$630,435.00	\$74,567.94	\$26,764.84	\$193,618.00	\$31,120.00	\$1,839,855.08
	Cost per family.....	\$19.33	\$18.11	\$2.23	\$0.68	\$1.70	\$30.01	\$3.53	\$1.27	\$9.22	\$1.48	\$87.59

TABLE IX.—General improvements outside of project.

Unit costs are assumed for comparison only. Only such improvements are included as were actually planned by the Corporation. Disposal plants, pumps, reservoirs, etc., are figured at actual or estimated cost, as the size varied in each project.

[illegible]

No.	Project.	Outfall sewers.				Sewage disposal plant.	Water mains.	Water pumping plant.	Gas mains.	Miscellaneous.	Total.
		Storm.	Sanitary.	Combined.	Manholes.						
	Unit cost.....	Lin. ft.	Lin. ft.	Lin. ft.			Lin. ft.		Lin. ft.		
456	Butler, Pa.: Quantity..... Cost..... Cost per family.....	\$3.50	\$1.50	\$3.50	\$40.00		\$2.50		\$1.50		
565	Charleston, S. C.: Quantity..... Cost..... Cost per family.....		3,820 \$5,730.00 \$36.73		8 \$320.00 \$2.06						\$6,050.00 \$38.79
18	Charleston, W. Va.: Quantity..... Cost..... Cost per family.....			188 \$658.00 \$7.56							\$658.00 \$7.56
1635	Chester, Pa.: Eddystone— Quantity..... Cost..... Cost per family.....	624 \$2,184.00 \$3.77	685 \$1,027.59 \$1.77		7 \$280.00 \$0.48						\$3,491.50 \$6.02
2947	Ridley Park— Quantity..... Cost..... Cost per family.....										
243	Dayton, Ohio: Edgemont— Quantity..... Cost..... Cost per family..... Leo Street— Quantity..... Cost..... Cost per family.....	120 \$420.00 \$0.55	380 \$570.00 \$0.72							Sewage pump- ing plant. \$32,000.00 \$40.66	\$32,990.00 \$41.03
244a	Elizabeth, N. J.: Site A— Quantity..... Cost..... Cost per family..... Site B— Quantity..... Cost..... Cost per family..... Site D— Quantity..... Cost..... Cost per family.....										
10	Erie, Pa.: East— Quantity..... Cost..... Cost per family..... West— Quantity..... Cost..... Cost per family.....	240 \$840.00 \$3.78 700 \$2,450.00 \$4.11	210 \$315.00 \$0.63				3,650 \$9,125.00 \$18.29				\$840.00 \$3.87 \$11,890.00 \$23.03
457	Hammond, Ind.: Quantity..... Cost..... Cost per family.....										
578	Hlon, N. Y.: Quantity..... Cost..... Cost per family.....										
1314	Indianapolis, Ind.: Quantity..... Cost..... Cost per family.....										
496	Indianhead, Md.: Quantity..... Cost..... Cost per family.....										
607	Kenilworth, N. J., Site E: Quantity..... Cost..... Cost per family.....										
398a	Lowell, Mass.: Houses High Street Extension— Quantity..... Cost..... Cost per family..... Livingston— Quantity..... Cost..... Cost per family.....										
2972	Lyles (Wrigley), Tenn.: Quantity..... Cost..... Cost per family..... Colored— Quantity..... Cost..... Cost per family.....	3,040 \$4,560.00 \$41.00 180 \$270.00 \$10.67				1 \$3,000.00 27.20	210 \$525.00 \$4.77				\$8,085.00 \$72.97 \$1,730.00 \$108.00
581	Mare Island (Vallejo), Calif.: Houses Quantity..... Cost..... Cost per family.....						2,530 \$6,325.00 \$15.10	1 \$7,500.00 \$17.90		Reservoir. \$5,600.00 \$13.37	\$19,425.00 \$46.37

TABLE IX.—General improvements outside of project—Continued.

No.	Project.	Outfall sewers.				Sewage disposal plant.	Water mains.	Water pumping plant.	Gas mains.	Miscellaneous.	Total.
		Storm.	Sanitary.	Combined.	Manholes.						
	Unit cost.....	Lin. ft. \$3.50	Lin. ft. \$1.50	Lin. ft. \$3.50	\$40.00		Lin. ft. \$2.50		Lin. ft. \$1.50		
381	Milton, Pa.: Hepburn Street— Quantity..... Cost..... Cost per family.....										
	Site B— Quantity..... Cost..... Cost per family.....										
997	Muskegon, Mich.: McCrack— Quantity..... Cost..... Cost per family.....										
	Schoenberg— Quantity..... Cost..... Cost per family.....										
880	Neville Island, Pa.: Coraopolis Quantity..... Cost..... Cost per family.....										
271	New Brunswick, N. J.: Quantity..... Cost..... Cost per family.....		560 \$840.00 \$4.94		3 \$120.00 \$0.30		388 \$970.00 \$1.47		2,308 \$3,462.00 \$8.74		\$5,392.00 \$15.44
1371	New Castle, Del.: Quantity..... Cost..... Cost per family.....										
157	New London, Conn.: Quantity..... Cost..... Cost per family.....	180 \$630.00 \$3.86	243 \$664.50 \$2.23								\$994.50 \$6.09
	Groton— Quantity..... Cost..... Cost per family.....										
722	New Orleans, La.: Quantity..... Cost..... Cost per family.....		2,700 \$4,050.00 \$19.38			1 \$500.00 \$2.39		1 \$1,000.00 \$14.36			\$7,550.00 \$36.13
382	Newport, R. I.: Quantity..... Cost..... Cost per family.....										
	Jamestown— Quantity..... Cost..... Cost per family.....										
	Newport News, Va.: Hilton Extension— Quantity..... Cost..... Cost per family.....										
57a											
57c	Briarfield— Quantity..... Cost..... Cost per family.....		1,090 \$1,635.00 \$2.97				5,460 \$13,650.00 \$24.82				\$15,285.00 \$27.79
404	Niagara Falls, N. Y.: Site A— Quantity..... Cost..... Cost per family.....										
	Site B— Quantity..... Cost..... Cost per family.....										
	Site C— Quantity..... Cost..... Cost per family.....		450 \$675.00 \$9.92				430 \$1,075.00 \$15.80				\$1,750.00 \$25.72
481	Niles, Ohio: Quantity..... Cost..... Cost per family.....	100 \$350.00 \$3.07	600 \$900.00 \$7.89								\$1,250.00 \$10.96
	Norfolk district: Cradock, Va.— Quantity..... Cost..... Cost per family.....		2,779 \$4,168.50 \$3.38				12,192 \$30,480.00 \$24.72				\$34,648.50 \$28.10
150b	Glenwood Park, Va. Quantity..... Cost..... Cost per family.....		816 \$1,224.00 \$1.89								\$1,224.00 \$1.89
150c	Truxtun, Va.— Quantity..... Cost..... Cost per family.....						3,998 \$9,995.00 \$39.51		3,000 \$4,500.00 \$17.79		\$14,495.00 \$57.30
60	Pensacola, Fla.: Quantity..... Cost..... Cost per family.....		520 \$780.00 \$5.78						1 \$5,000.00 \$37.04	Water tower, etc. ¹ \$16,065.00 \$119.00	\$21,845.00 \$161.82

¹ Includes water tower, one 8-inch well, four 1-inch test wells, air compressor, power house, transformer.

TABLE IX.—General improvements outside of project—Continued.

No.	Project.	Outfall sewers				Sewage disposal plant.	Water mains.	Water pumping plant.	Gas mains.	Miscellaneous.	Total.
		Storm.	Sanitary.	Combined.	Manholes						
	Unit cost.....	Lin. ft. \$3.50	Lin. ft. \$1.50	Lin. ft. \$3.50	\$40.00		Lin. ft. \$2.50		Lin. ft. \$1.50		
471	Perth Amboy, N. J.: Quantity..... Cost..... Cost per family.....										
503	Philadelphia, Pa.: Navy Yard, Oregon Avenue— Quantity..... Cost..... Cost per family.....										
1536	Tacony— Quantity..... Cost..... Cost per family.....										
2125	Pompton Lakes, N. J.: Quantity..... Cost..... Cost per family.....										
604	Portsmouth, N. H. (Kittery, Me.): Quantity..... Cost..... Cost per family.....					1 \$5,500 \$85.94					\$5,500.00 \$85.94
2728	Portsmouth, Ohio. (second site): Quantity..... Cost..... Cost per family.....										
241	Puget Sound Navy Yard (Bremer- ton), Wash., Inside: Quantity..... Cost..... Cost per family.....										
62	Quincy, Mass.: Arnold Street— Quantity..... Cost..... Cost per family..... Baker Yacht Basin— Quantity..... Cost..... Cost per family..... River Street— Quantity..... Cost..... Cost per family.....										
246c	Rock Island district: Davenport, Iowa— King— Quantity..... Cost..... Cost per family..... McManus— Quantity..... Cost..... Cost per family..... Park Lane— Quantity..... Cost..... Cost per family.....	220 \$770.00 \$3.26									\$770.00 \$3.26
246a	Moline, Ill.— Quantity..... Cost..... Cost per family.....										
246b	East Moline, Ill.: Deere— Quantity..... Cost..... Cost per family..... Highlands— Quantity..... Cost..... Cost per family.....										
246c	Rock Island, Ill.: Quantity..... Cost..... Cost per family.....										
1368	Seven Pines, Va.: Quantity..... Cost..... Cost per family.....										
138	Sharon, Pa.: Quantity..... Cost..... Cost per family.....										
1535	South Bend, Ind.: Quantity..... Cost..... Cost per family.....			560 \$1,960.00 \$4.52							\$1,960.00 \$4.52
130	Staten Island, N. Y.: Apartments— Quantity..... Cost..... Cost per family..... Houses— Quantity..... Cost..... Cost per family.....										
			813 \$1,219.50 \$15.62		4 \$160.00 \$2.05		1,684 \$4,210.00 \$53.97				\$5,589.50 \$71.64

TABLE IX.—General improvements outside of project—Continued.

No	Project.	Outfall sewers.				Sewage disposal plant.	Water mains.	Water pumping plant.	Gas mains.	Miscellaneous.	Total.
		Storm.	Sanitary.	Combined.	Manholes.						
	Unit cost.....	Lin. ft. \$3.50	Lin. ft. \$1.50	Lin. ft. \$3.50	\$40.00		Lin. ft. \$2.50		Lin. ft. \$1.50		
118	Warren, Ohio:										
	Northeast—										
	Quantity.....										
	Cost.....										
	Cost per family.....										
	Southeast—										
	Quantity.....										
	Cost.....										
	Cost per family.....										
	Washington, D. C., district:										
27a	Navy Yard—										
	Apartment—										
	Quantity.....			850							
	Cost.....			\$2,975.00							\$2,975.00
	Cost per family.....			\$4.14							\$4.14
27b	Houses—										
	Quantity.....										
	Cost.....										
	Cost per family.....										
54c	Residence Halls—										
	Twenty-first and B										
	Streets—										
	Quantity.....										
	Cost.....										
	Cost per family.....										
54f	Bureau of Standards—										
	Quantity.....										
	Cost.....										
	Cost per family.....										
54g	South Capitol Street—										
	Quantity.....										
	Cost.....										
	Cost per family.....										
54h	Steel & Ordnance Co.—										
	Quantity.....					1,000				Reservoir.....	
	Cost.....					\$2,500.00				\$5,000.00	\$7,500.00
	Cost per family.....					\$33.79				\$67.57	\$101.36
380	Waterbury, Conn.:										
	Chase—										
	Quantity.....		4,378		22	1,590					
	Cost.....		\$6,567.00		\$880.00	\$3,975.00					\$11,422.00
	Cost per family.....		\$93.81		\$12.57	\$56.79					\$163.17
	Sylvan Avenue—										
	Quantity.....		306		2	436					
	Cost.....		\$459.00		\$80.00	\$1,000.00					\$1,629.00
	Cost per family.....		\$3.40		\$0.59	\$8.03					\$12.02
389	Watertown, N. Y.:										
	Quantity.....										
	Cost.....										
	Cost per family.....										
151	Watervliet, (Troy), N. Y.:										
	Quantity.....										
	Cost.....										
	Cost per family.....										
	Total, 97 sites, 21,005 families:										
	Quantity.....	5,241	28,370	1,598	55	5	41,402	4	5,308	13	
	Cost.....	\$18,343.50	\$42,555.00	\$5,593.00	\$2,200.00	\$39,800.00	\$103,505.00	\$40,500.00	\$7,962.00	\$71,165.00	\$331,623.50
	Cost per family.....	\$0.88	\$2.03	\$0.26	\$0.11	\$1.90	\$4.94	\$1.88	\$0.39	\$3.39	\$15.78



TABLE X.—Lot improvements, excluding buildings.

Unit costs are assumed for comparison only. "Common roadways" and "Common walks" include driveways and walks to apartment houses and all roadways and walks other than on public streets which serve more than one family. The unit cost for "House walks" is assumed to cover concrete front walk and gravel rear walk. "Preparing lawns" includes finished grading, topsoiling, fertilizing, seed, and seeding. The Housing Corporation did not usually specify sodding except on certain projects in limited amounts for edging, steep slopes, or narrow strips of lawn. The unit cost for "Lot trees" and "Shrubs and vines" includes preparing the holes or beds, fertilizing, plants, and planting.

The unit cost for "Hedge" is given per linear foot to facilitate comparison with fencing, which it normally replaces. The unit cost for "Fence" provides for a chain link mesh 3½ feet high, with steel posts and top rails. The unit cost for "Clothes drier" assumes a 6-foot reel set in place. On a few projects two clothes posts with cross arms or four posts were used, involving a somewhat higher expense per family.

No.	Project.	Common roadways.	Common walks.	House walks.	House connections.		Preparing lawns.	Lot trees.	Shrubs and vines.	Hedge.	Fence.	Clothes driers.	Total.
		Sq. yds.	Sq. yds.	Sq. yds.	Lin. ft.	Lin. ft.	Sq. yds.			Lin. ft.	Lin. ft.		
56	Aberdeen, Md.: Unit cost.....	\$2.00	\$2.00	\$1.50	\$0.40	\$0.50	\$0.25	\$2.00	\$0.50	\$0.30	\$0.75	\$7.00	.....
	Quantity.....	0	0	1,958	3,057	3,352	21,200	70	3,931	2,100	0	80	.....
	Cost.....			\$2,937.00	\$1,222.80	\$1,676.00	\$6,050.00	\$140.00	\$1,965.50	\$630.00		\$560.00	\$15,181.30
	Cost per family.....			\$36.71	\$15.28	\$20.95	\$75.63	\$1.75	\$24.57	\$7.88		\$7.00	\$189.77
185	Alabama nitrate district: Florence— Quantity.....	0	75	1,780	×	4,400	67,760	250	1,350	0	15,824	123	.....
	Cost.....		\$150.00	\$2,670.00		\$2,200.00	\$16,940.00	\$500.00	\$675.00		\$11,868.00	\$861.00	\$35,864.00
	Cost per family.....		\$1.22	\$21.77		\$17.89	\$137.72	\$4.07	\$5.49		\$96.49	\$7.00	\$291.65
397	Shellfield— Quantity.....	0	47	2,073	×	8,340	62,920	304	582	500	20,840	114	.....
	Cost.....		\$94.00	\$3,109.50		\$3,336.00	\$15,730.00	\$608.00	\$291.00	\$150.00	\$15,630.00	\$798.00	\$39,746.50
	Cost per family.....		\$0.82	\$27.28		\$29.73	\$137.98	\$5.33	\$2.54	\$1.32	\$137.10	\$7.00	\$349.10
1163	Tusculum— Quantity.....	0	0	1,044	×	×	33,396.00	145	400	0	8,760	52	.....
	Cost.....			\$1,566.00			\$8,349.00	\$290.00	\$200.00		\$6,570.00	\$364.00	\$17,339.00
	Cost per family.....			\$30.11			\$160.56	\$5.58	\$3.85		\$126.34	\$7.00	\$333.44
621	Alliance, Ohio: Northwest— Quantity.....	0	0	469	2,850	3,250	14,323	0	705	0	2,092	52	.....
	Cost.....			\$703.50	\$1,140.00	\$1,625.00	\$3,580.75		\$352.50		\$1,569.00	\$364.00	\$9,334.75
	Cost per family.....			\$13.53	\$22.69	\$31.25	\$68.85		\$6.78		\$30.17	\$7.00	\$180.27
	Southeast— Quantity.....	0	0	4,430	14,560	15,634	30,180	0	1,493	0	7,056	213	.....
	Cost.....			\$6,645.00	\$5,824.00	\$7,817.00	\$7,545.00		\$746.50		\$5,292.00	\$1,491.00	\$35,360.50
	Cost per family.....			\$31.20	\$27.34	\$36.69	\$35.42		\$3.50		\$24.85	\$7.00	\$166.00
554	Alton, Ill.: Broadway— Quantity.....	0	0	644	1,200	1,800	17,042	×	×	1,500	5,420	0	.....
	Cost.....			\$966.00	\$480.00	\$900.00	\$4,260.50			\$450.00	\$4,065.00		\$11,121.50
	Cost per family.....			\$20.13	\$21.82	\$40.91	\$88.76			\$9.38	\$84.27		\$265.27
	East Alton— Quantity.....	0	0	244	150	713	10,180	×	×	984	2,000	15	.....
	Cost.....			\$366.00	\$60.00	\$356.50	\$2,545.00			\$295.20	\$1,500.00	\$105.00	\$5,227.70
	Cost per family.....			\$24.40	\$4.00	\$23.77	\$169.66			\$19.68	\$100.00	\$7.00	\$348.51
	Milton Hill— Quantity.....	0	0	3,278	12,935	12,937	99,910	×	×	12,600	19,640	284	.....
	Cost.....			\$4,917.00	\$5,174.00	\$6,468.50	\$24,927.50			\$3,780.00	\$9,820.00	\$1,988.00	\$57,075.00
	Cost per family.....			\$17.29	\$18.22	\$22.78	\$87.77			\$13.31	\$34.56	\$7.00	\$200.93
59	Bath, Me.: Quantity.....	0	146	249	5,332	2,400	39,210	78	2,964	0	7,068	90	.....
	Cost.....		\$292.00	\$372.75	\$2,132.80	\$1,200.00	\$9,802.50	\$156.00	\$1,482.00		\$5,301.00	\$630.00	\$21,369.05
	Cost per family.....		\$3.24	\$4.14	\$23.70	\$13.33	\$108.92	\$1.73	\$16.47		\$58.90	\$7.00	\$237.43
24	Bethlehem, Pa.: Quantity.....	1,867	0	26,936	60,000	60,000	522,563	1,666	17,830	0	17,675	1,258	.....
	Cost.....	\$3,734.00		\$40,404.00	\$24,000.00	\$30,000.00	\$130,640.75	\$3,332.00	\$8,915.00		\$13,256.25	\$8,806.00	\$263,088.00
	Cost per family.....	\$2.97		\$32.12	\$19.16	\$23.85	\$103.85	\$2.65	\$7.09		\$10.54	\$7.00	\$209.23
102	Bridgeport, Conn.: Houses—Black Rock (1)— Quantity.....	2,323	730	0	1,267	860	9,580	374	2,100	470	260	0	.....
	Cost.....	\$4,646.00	\$1,460.00		\$506.80	\$430.00	\$2,395.00	\$748.00	\$1,050.00	\$141.00	\$195.00		\$11,571.80
	Cost per family.....	\$21.51	\$6.76		\$2.35	\$1.99	\$11.09	\$3.46	\$4.86	\$0.65	\$0.90		\$53.57
	Connecticut Avenue (14)— Quantity.....	1,167	377	0	911	530	5,500	211	1,572	360	100	0	.....
	Cost.....	\$2,334.00	\$754.00		\$364.40	\$265.00	\$1,375.00	\$422.00	\$786.00	\$108.00	\$75.00		\$6,483.40
	Cost per family.....	\$21.61	\$6.98		\$3.37	\$2.45	\$12.82	\$3.91	\$7.28	\$1.00	\$0.69		\$60.11
	Crane (4)— Quantity.....	1,404	766	2,240	8,673	16,170	52,575	301	1,135	18,456	24,100	377	.....
	Cost.....	\$2,808.00	\$1,532.00	\$3,360.00	\$3,469.20	\$8,085.00	\$13,143.25	\$602.00	\$567.50	\$5,536.80	\$18,075.00	\$2,639.00	\$59,417.75
	Cost per family.....	\$7.45	\$4.06	\$8.91	\$9.20	\$21.45	\$34.86	\$1.59	\$1.50	\$14.69	\$47.94	\$7.00	\$158.65
	Grasmere (12)— Quantity.....	0	173	2,716	1,071	4,000	24,000	48	1,513	6,537	1,760	101	.....
	Cost.....		\$346.00	\$4,074.00	\$428.40	\$2,000.00	\$6,000.00	\$96.00	\$756.50	\$1,961.10	\$1,320.00	\$707.00	\$17,689.00
	Cost per family.....		\$3.43	\$40.34	\$4.24	\$19.80	\$59.49	\$0.95	\$7.47	\$19.42	\$13.07	\$7.00	\$175.21
	Mill Green (5)— Quantity.....	338	107	1,864	3,341	2,634	63,050	20	2,046	8,784	1,070	111	.....
	Cost.....	\$676.00	\$214.00	\$2,796.00	\$1,336.40	\$1,317.00	\$15,762.50	\$40.00	\$1,023.00	\$2,635.26	\$802.50	\$777.00	\$28,379.66
	Cost per family.....	\$6.09	\$1.93	\$25.19	\$12.04	\$11.86	\$142.00	\$0.36	\$9.21	\$23.74	\$7.23	\$7.00	\$246.65
	Mill Green Cemetery Extension— Quantity.....	0	0	1,282	2,236	2,400	26,670	61	1,855	9,443	925	96	.....
	Cost.....			\$1,923.00	\$894.40	\$1,200.00	\$6,667.50	\$122.00	\$927.50	\$2,832.90	\$693.75	\$672.00	\$15,933.05
	Cost per family.....			\$20.03	\$9.32	\$13.02	\$69.45	\$1.27	\$9.66	\$29.41	\$7.23	\$7.00	\$166.39
102a	Temporary Flats— Cemetery Site— Quantity.....	0	848	0	3,260	3,260	23,000	160	×	0	0	0	.....
	Cost.....		\$1,696.00		\$1,304.00	\$1,630.00	\$5,750.00	\$320.00					\$10,700.00
	Cost per family.....		\$8.00		\$6.15	\$7.69	\$27.12	\$1.51					\$50.47
	Hill Top— Quantity.....	0	815	0	3,660	3,660	25,000	150	×	0	0	0	.....
	Cost.....		\$1,630.00		\$1,464.00	\$1,880.00	\$6,250.00	\$300.00					\$11,474.00
	Cost per family.....		\$8.67		\$7.79	\$9.73	\$33.24	\$1.60					\$61.03

TABLE X.—Lot improvements, excluding buildings—Continued.

No.	Project.	Common roadways.	Common walks.	House connections.		Preparing lawns.	Lot trees.	Shrubs and vines.	Hedge.	Fence.	Clothes driers.	Total.
		Sq. yds.	Sq. yds.	Sq. yds.	Lin. ft.	Lin. ft.						
	Unit cost	\$2.00	\$2.00	\$1.50	\$0.40	\$0.50	\$0.25	\$2.00	\$0.50	\$0.30	\$0.75	\$7.00
456	Butler, Pa.: Quantity.....	0	0	2,862	5,940	6,345	29,490	196	1,151	7,410	17,885	167
	Cost.....			\$4,293.00	\$2,376.00	\$3,172.50	\$7,372.50	\$392.00	\$577.50	\$2,223.00	\$13,413.75	\$1,169.00
	Cost per family.....			\$25.71	\$14.23	\$18.99	\$44.14	\$2.34	\$3.44	\$13.31	\$80.32	\$7.00
565	Charleston, S. C.: Quantity.....	0	0	2,910	6,560	6,560	32,744	0	×	0	0	156
	Cost.....			\$4,365.00	\$2,624.00	\$3,280.00	\$8,186.00					\$1,092.00
	Cost per family.....			\$27.98	\$16.82	\$21.63	\$52.47					\$7.00
18	Charleston, W. Va.: Quantity.....	0	0	1,594	×	3,825	13,828	0	375	5,404	7,260	87
	Cost.....			\$2,391.00		\$1,912.50	\$3,457.00		\$188.00	\$1,621.00	\$5,445.00	\$609.00
	Cost per family.....			\$26.33		\$21.98	\$39.74		\$2.39	\$18.63	\$62.59	\$7.00
1635	Chester, Pa.: Eddystone Quantity.....	0	959	7,568	×	×	107,000	890	16,170	5,000	34,320	580
	Cost.....		\$1,918.00	\$11,352.00			\$26,750.00	\$1,780.00	\$8,085.00	\$1,500.00	\$25,740.00	\$4,060.00
	Cost per family.....		\$3.48	\$19.57			\$46.12	\$3.07	\$16.17	\$2.59	\$14.38	\$7.00
2947	Ridley Park— Quantity.....	0	×	10,820	×	×	127,400	841	15,000	7,500	33,800	565
	Cost.....			\$13,230.00			\$31,550.00	\$1,682.00	\$7,500.00	\$2,250.00	\$25,350.00	\$3,955.00
	Cost per family.....			\$23.42			\$56.37	\$2.98	\$13.27	\$3.98	\$14.87	\$7.00
243	Dayton, Ohio: Edgemont Quantity.....	2,279	3,688	9,922	25,500	30,700	68,244	560	4,786	24,100	0	787
	Cost.....	\$4,558.00	\$7,376.00	\$14,883.00	\$10,200.00	\$15,350.00	\$17,061.00	\$1,120.00	\$2,393.00	\$7,230.00		\$5,509.00
	Cost per family.....	\$5.79	\$9.37	\$18.91	\$12.96	\$19.50	\$21.68	\$1.42	\$3.04	\$9.19		\$7.00
	Leo Street— Quantity.....	0	0	557	560	1,110	3,807	20	256	4,370	0	40
	Cost.....			\$1,286.00	\$224.00	\$555.00	\$952.00	\$40.00	\$128.00	\$1,311.00		\$280.00
	Cost per family.....			\$32.15	\$5.60	\$13.87	\$23.80	\$1.00	\$3.20	\$32.78		\$7.00
244a	Elizabeth, N. J.: Site A— Quantity.....	0	0	1,452	2,900	2,670	24,000	50	300	8,136	0	50
	Cost.....			\$2,178.00	\$1,160.00	\$1,335.00	\$6,000.00	\$100.00	\$150.00	\$2,440.80		\$350.00
	Cost per family.....			\$13.56	\$23.20	\$26.70	\$120.00	\$2.00	\$3.00	\$48.82		\$7.00
	Site B— Quantity.....	0	211	2,370	5,000	5,200	13,100	0	312	0	6,468	104
	Cost.....		\$422.00	\$3,555.00	\$200.00	\$2,600.00	\$3,275.00		\$156.00		\$4,851.00	\$728.00
	Cost per family.....		\$4.06	\$34.11	\$1.94	\$25.00	\$31.49		\$1.50		\$16.63	\$7.00
	Site D— Quantity.....	0	0	1,235	2,970	2,870	22,264	50	300	9,496	0	50
	Cost.....			\$1,852.50	\$1,188.00	\$1,435.00	\$5,566.00	\$100.00	\$150.00	\$2,848.80		\$350.00
	Cost per family.....			\$37.05	\$23.75	\$28.70	\$111.32	\$2.00	\$3.00	\$56.98		\$7.00
10	Erie, Pa.: East— Quantity.....	0	0	3,600	7,824	8,300	73,667	550	2,230	8,901	13,200	223
	Cost.....			\$5,400.00	\$3,129.60	\$4,150.00	\$18,416.75	\$1,100.00	\$1,115.00	\$2,670.30	\$9,900.00	\$1,561.00
	Cost per family.....			\$24.22	\$14.03	\$18.61	\$82.59	\$1.94	\$5.00	\$11.97	\$44.35	\$7.00
	West— Quantity.....	0	0	7,100	20,000	19,480	145,200	1,074	6,866	23,735	25,112	499
	Cost.....			\$10,650.00	\$8,000.00	\$9,740.00	\$36,300.00	\$2,148.00	\$3,433.00	\$7,120.50	\$18,834.00	\$4,893.00
	Cost per family.....			\$21.14	\$16.03	\$19.52	\$72.74	\$4.30	\$6.88	\$14.27	\$37.74	\$7.00
457	Hammond, Ind.: Quantity.....	0	0	1,414	4,148	10,500	38,820	176	1,421	0	0	174
	Cost.....			\$2,121.00	\$1,659.20	\$5,250.00	\$9,705.00	\$152.00	\$710.50			\$1,218.00
	Cost per family.....			\$12.19	\$9.54	\$30.18	\$53.77	\$2.02	\$4.08			\$7.00
578	Ilion, N. Y.: Quantity.....	0	0	2,638	8,025	7,911	40,978	×	×	0	0	154
	Cost.....			\$3,957.00	\$3,210.00	\$3,955.50	\$10,244.50					\$1,078.00
	Cost per family.....			\$24.89	\$20.84	\$25.69	\$64.43					\$7.00
1314	Indianapolis, Ind.: Quantity.....	1,124	800	400	1,620	1,600	10,062	7	160	344	0	0
	Cost.....	\$2,248.00	\$1,600.00	\$600.00	\$648.00	\$800.00	\$2,515.50	\$11.00	\$80.00	\$103.20		\$8,608.70
	Cost per family.....	\$102.18	\$72.73	\$27.27	\$13.50	\$16.67	\$114.34	\$0.64	\$3.64	\$4.69		\$55.66
496	Indianhead, Md.: Quantity.....	363	462	4,730	4,037	6,174	99,277	×	3,000	0	0	190
	Cost.....	\$726.00	\$924.00	\$7,095.00	\$1,614.80	\$3,087.00	\$24,819.00		\$1,500.00			\$1,330.00
	Cost per family.....	\$3.82	\$4.86	\$37.34	\$8.49	\$16.25	\$130.57		\$7.89			\$7.00
607	Kenilworth, N. J., Site E: Quantity.....	0	0	1,356	1,876	1,876	12,695	44	154	7,032	0	52
	Cost.....			\$1,155.00	\$342.40	\$938.00	\$3,173.75	\$88.00	\$77.00	\$2,109.60		\$364.00
	Cost per family.....			\$22.21	\$10.43	\$18.04	\$61.03	\$1.69	\$1.48	\$40.57		\$7.00
398a	Lowell, Mass.: Houses— High Street Extension Quantity.....	0	0	1,083	2,870	3,190	9,787	81	1,400	2,260	0	83
	Cost.....			\$2,524.50	\$1,148.00	\$1,595.00	\$2,446.75	\$162.00	\$700.00	\$978.00		\$581.00
	Cost per family.....			\$30.42	\$13.51	\$18.76	\$29.48	\$1.95	\$8.43	\$8.17		\$7.00
	Livinston Quantity.....	0	0	800	×	2,420	5,967	×	×	0	0	40
	Cost.....			\$1,200.00		\$1,210.00	\$1,191.75					\$280.00
	Cost per family.....			\$30.00		\$30.25	\$37.29					\$7.00
2972	Lyles (Wrigley), Tenn.: Quantity.....	0	0	2,366	×	×	67,760	360	1,750	0	29,860	110
	Cost.....			\$3,549.00			\$16,910.00	\$720.00	\$875.00		\$22,395.00	\$770.00
	Cost per family.....			\$32.24			\$154.00	\$6.55	\$7.95		\$203.59	\$7.00
	Colored— Quantity.....	0	0	302	×	×	3,936	30	75	0	4,360	15
	Cost.....			\$453.00			\$84.00	\$60.00	\$38.00		\$3,270.00	\$105.00
	Cost per family.....			\$80.20			\$65.60	\$4.00	\$2.53		\$218.00	\$7.00
581	Mare Island (Vallejo), Calif., Houses: Quantity.....	0	848	4,043	13,285	11,377	\$6,270	0	18,000	0	0	419
	Cost.....		\$1,696.00	\$6,095.00	\$5,314.00	\$5,588.50	\$21,568.00		\$9,000.00		\$2,933.00	\$39,320.25
	Cost per family.....		\$4.05	\$14.47	\$12.41	\$13.57	\$51.24		\$21.48		\$7.00	\$124.25

REPORT UNITED STATES HOUSING CORPORATION.

TABLE X. *-Lot improvements, including buildings*—Continued.

No.	Project.	Common road-ways.	Common walks.	House walks.	House connections.		Preparing lawns.	Lot trees.	Shrubs and vines.	Hedge.	Fence.	Clothes driers.	Total.
					Sewer.	Water.							
	Unit cost.....	Sq. yds. \$2.00	Sq. yds. \$2.00	Sq. yds. \$1.50	Lin. ft. \$0.40	Lin. ft. \$0.50	Sq. yds. \$0.25	\$2.00	\$0.50	Lin. ft. \$0.30	Lin. ft. \$0.75	\$7.00	
381	Milton, Pa.: Hepburn Street— Quantity..... Cost..... Cost per family..... Site B— Quantity..... Cost..... Cost per family.....	0 109 \$218.00 \$9.08	218 \$327.00 \$13.63	780 \$312.00 \$13.00	840 \$420.00 \$17.50	15,275 \$3,819.00 \$139.13	72 \$141.00 \$6.00	240 \$120.00 \$5.00	0 0 0	0 0 0	24 \$168.00 \$7.00	\$5,528.00 \$230.34	
997	Muskegon, Mich.: McGrath— Quantity..... Cost..... Cost per family..... Schoenbale— Quantity..... Cost..... Cost per family.....	0 0 0 0 0 0 0	1,482 \$2,223.00 \$13.68 453 \$680.00 \$22.67	2,970 \$1,188.00 \$18.00 1,500 \$600.00 \$20.00	3,498 \$1,749.00 \$20.50 1,500 \$750.00 \$25.00	16,810 \$4,203.00 \$63.68 33,775 \$8,444.00 \$34.04	78 \$156.00 \$2.36 218 \$496.00 \$2.00	275 \$138.00 \$2.09 2,976 \$1,488.00 \$6.00	0 0 0 0 0 0	0 0 0 0 0 0	66 \$462.00 \$7.00 248 \$1,736.00 \$7.00 30 \$210.00 \$7.00	\$10,119.00 \$153.21 \$11,506.69 \$101.05 \$3,934.00 \$131.14	
880	Neville Island, Pa., Coraopolis: Quantity..... Cost..... Cost per family.....	0 30 \$60.00 \$0.80	1,522 \$2,283.00 \$30.44	3,900 \$1,560.00 \$20.80	4,000 \$2,000.00 \$26.67	0 0 0	0 0 0	0 0 0	0 0 0	10,416 \$7,812.00 \$104.16	75 \$525.00 \$7.00	\$14,240.00 \$189.87	
271	New Brunswick, N. J.: Quantity..... Cost..... Cost per family.....	0 407 \$814.00 \$2.05	5,893 \$8,839.00 \$22.26	16,939 \$6,775.60 \$17.09	21,176 \$10,588.00 \$26.67	91,180 \$22,795.00 \$57.42	187 \$374.00 \$0.94	3,536 \$1,768.00 \$4.45	26,850 \$4,129.00 \$10.40	0 0 0	397 \$2,779.00 \$7.00	\$58,861.60 \$148.28	
1371	New Castle, Del.: Quantity..... Cost..... Cost per family.....	0 0 0 0	1,045 \$1,568.00 \$34.09 507 \$761.00 \$30.44	2,310 \$924.00 \$20.09 970 \$388.00 \$15.52	1,220 \$610.00 \$13.26 690 \$345.00 \$13.80	10,046 \$2,512.00 \$54.61 5,507 \$1,377.00 \$55.08	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	46 \$322.00 \$7.00 25 \$175.00 \$7.00	\$5,936.00 \$129.05 \$3,531.00 \$141.24		
157	New London, Conn.: Quantity..... Cost..... Cost per family..... Groton— Quantity..... Cost..... Cost per family.....	0 0 0 0 0 0 0	4,125 \$6,188.00 \$37.96 507 \$761.00 \$30.44	6,312 \$2,524.80 \$15.49 970 \$388.00 \$15.52	8,109 \$4,054.50 \$24.87 690 \$345.00 \$13.80	20,556 \$5,139.00 \$31.52 5,507 \$1,377.00 \$55.08	104 \$208.00 \$1.28 0 0 0	2,472 \$1,236.00 \$7.58 390 \$195.00 \$2.00	5,900 \$1,770.00 \$10.85 965 \$290.00 \$3.00	0 0 0 0 0	163 \$1,141.00 \$7.00 25 \$175.00 \$7.00	\$22,261.30 \$136.55 \$3,531.00 \$141.24	
722	New Orleans, La.: Quantity..... Cost..... Cost per family.....	0 0 0 0	7,315 \$10,973.00 \$52.50 214 \$321.00 \$32.10	×	×	77,637 \$19,400.00 \$92.86 4,433 \$1,108.00 \$110.80	0 0 0 0 0	0 0 0 0 0	27,170 \$8,151.00 \$39.00 2,320 \$696.00 \$30.00	0 0 0 0 0	209 \$1,463.00 \$7.00 10 \$70.00 \$7.00	\$39,996.00 \$191.36 \$2,525.00 \$252.50	
382	Newport, R. I.: Quantity..... Cost..... Cost per family..... Jamestown— Quantity..... Cost..... Cost per family.....	0 0 0 0 0 0 0	1,183 \$1,775.00 \$26.10 214 \$321.00 \$32.10	2,000 \$800.00 \$11.76 ×	2,000 \$1,000.00 \$14.71 400 \$200.00 \$20.00	13,130 \$3,283.00 \$48.27 4,433 \$1,108.00 \$110.80	10 \$80.00 \$1.18 20 \$40.00 \$4.00	1,200 \$600.00 \$8.82 180 \$90.00 \$9.00	9,016 \$2,705.00 \$39.78 2,320 \$696.00 \$30.00	0 0 0 0 0	68 \$476.00 \$7.00 10 \$70.00 \$7.00	\$10,719.00 \$157.62 \$2,525.00 \$252.50	
571	Newport News, Va.: Hilton Extension— Quantity..... Cost..... Cost per family.....	0 1,399 \$2,798.00 \$6.02	18,512 \$27,768.00 \$22.42	24,250 \$9,700.00 \$20.00	24,000 \$12,000.00 \$24.74	93,727 \$23,431.75 \$50.39	×	×	4,160 \$35,628.00 \$76.62	47,504 \$3,255.00 \$7.00	465 \$3,255.00 \$7.00	\$14,580.75 \$207.19	
57c	Brattleboro— Quantity..... Cost..... Cost per family.....	0 4,538 \$9,076.00 \$16.50	10,694	×	×	68,778 \$17,194.50 \$31.26	122 \$244.00 \$0.44	0 0 0	0 0 0	×	550 \$3,850.00 \$7.00	\$46,405.50 \$84.36	
404	Niagara Falls, N. Y.: Site A— Quantity..... Cost..... Cost per family..... Site B— Quantity..... Cost..... Cost per family..... Site C— Quantity..... Cost..... Cost per family.....	0 525 \$1,050.00 \$7.89 0 4,822 \$7,233.00 \$36.17 0 1,754 \$2,631.00 \$38.69	4,624 \$6,936.00 \$52.08 9,840 \$3,936.00 \$36.17 3,640 \$1,456.00 \$38.69	7,038 \$2,815.20 \$21.17 9,640 \$3,820.00 \$19.63 3,530 \$1,765.00 \$21.41	6,500 \$3,280.00 \$24.66 9,640 \$3,820.00 \$24.10 3,530 \$1,765.00 \$26.00	46,552 \$11,638.00 \$87.50 27,200 \$6,800.00 \$34.00 15,683 \$3,921.00 \$57.06	140 \$280.00 \$2.11 200 \$400.00 \$2.00 75 \$150.00 \$2.21	3,490 \$1,745.00 \$13.12 5,485 \$2,743.00 \$13.72 1,670 \$835.00 \$228.00	2,519 \$1,259.50 \$5.68 1,246 \$374.00 \$1.87 760 \$353.00 \$228.00	19,500 \$14,625.00 \$129.38 19,414 \$14,561.00 \$72.81 7,244 \$5,433.00 \$79.89	133 \$931.00 \$7.00 200 \$1,400.00 \$7.00 68 \$476.00 \$7.00	\$44,056.20 \$350.50 \$42,267.00 \$211.30 \$16,895.00 \$248.48	
481	Niles, Ohio: Quantity..... Cost..... Cost per family..... Norfolk District: Cradoek, Va.— Quantity..... Cost..... Cost per family.....	0 2,211 \$3,317.00 \$28.35 0 0 0 0	5,800 \$11,793.00 \$28.35 4,822 \$7,233.00 \$36.17 1,754 \$2,631.00 \$38.69	5,800 \$2,320.00 \$20.35 9,640 \$3,820.00 \$19.63 3,530 \$1,765.00 \$21.41	5,700 \$2,550.00 \$25.00 9,640 \$3,820.00 \$24.10 3,530 \$1,765.00 \$26.00	27,228 \$6,807.00 \$58.18 178,433 \$44,608.25 \$36.11	0 \$50.00 \$4.70 800 \$1,600.00 \$1.29	1,100 \$550.00 \$4.70 8,490 \$4,245.00 \$22.42	0 0 0 0 0	4,188 \$3,141.00 \$26.85 8,440 \$4,532.00 \$22.42	117 \$819.00 \$7.00 0 0 0	\$19,804.00 \$170.43 \$116,548.75 \$94.43	
150b	Glenwood Park, Va.— Quantity..... Cost..... Cost per family.....	0 0 0 0	0 0 0 0	×	×	118,000 \$29,500.00 \$45.53	830 \$1,660.00 \$2.56	8,490 \$4,245.00 \$22.42	48,440 \$14,532.00 \$22.42	0 0 0	648 \$4,536.00 \$7.00	\$54,473.00 \$84.06	
150c	Truxton, Va.— Quantity..... Cost..... Cost per family.....	0 0 0 0	3,346 \$5,023.00 \$19.85	29,484 \$11,793.00 \$19.85	11,000 \$5,500.00 \$21.74	48,025 \$12,006.25 \$47.46	992 \$1,984.00 \$7.84	14,025 \$7,012.50 \$27.72	15,825 \$14,747.50 \$18.76	24,838 \$18,628.00 \$73.63	253 \$1,771.00 \$7.00	\$68,465.25 \$270.61	
60	Pensacola, Fla.: Quantity..... Cost..... Cost per family.....	0 0 0 0	3,186 \$1,779.00 \$35.40	7,500 \$3,000.00 \$22.22	7,500 \$3,750.00 \$27.78	37,495 \$9,374.00 \$69.44	×	×	0 0 0	0 0 0	135 \$915.00 \$7.00	\$21,818.00 \$270.61	

TABLE X.—Lot improvements, excluding buildings—Continued.

No.	Project.	Common road-ways.	Common walks.	House walks.	House connections.		Preparing lawns.	Lot trees.	Shrubs and vines.	Hedge.	Fence.	Clothes driers.	Total.
		Sq. yds. \$2.00	Sq. yds. \$2.00	Sq. yds. \$1.50	Lin. ft. \$0.40	Lin. ft. \$0.50	Sq. yds. \$0.25			Lin. ft. \$0.30	Lin. ft. \$0.75	\$7.00	
	Unit cost.....												
471	Perth Amboy, N. J.:												
	Quantity.....	0	0	808	×	×	7,260	0	500	4,350	6,854	150	
	Cost.....			\$1,302.00			\$1,815.00		\$280.00	\$922.20	\$5,141.00	\$1,092.00	\$10,552.20
	Cost per family.....			\$8.35			\$11.63		\$1.79	\$5.91	\$32.96	\$7.00	\$67.64
501	Philadelphia, Pa.:												
	Navy Yard, Oregon Ave.—												
	Quantity.....	0	0	5,222	6,770	18,754	23,933	0	0	0	14,748	166	
	Cost.....			\$7,833.00	\$2,708.00	\$9,377.00	\$5,983.00				\$10,304.00	\$4,872.00	\$41,077.00
	Cost per family.....			\$11.25	\$3.89	\$13.47	\$8.59				\$14.80	\$7.00	\$59.00
1536	Tacony—												
	Quantity.....	0	1,825	4,036	×	3,680	23,236	0	×	0	11,872	208	
	Cost.....		\$3,650.00	\$6,054.00		\$1,840.00	\$5,809.00				\$8,904.00	\$1,876.00	\$28,133.00
	Cost per family.....		\$13.12	\$22.59		\$6.86	\$21.68				\$33.22	\$7.00	\$104.97
2125	Pompton Lakes, N. J.:												
	Quantity.....	0	0	456	621	1,363	6,137	0	0	0	0	0	
	Cost.....			\$884.00	\$248.40	\$681.50	\$1,534.25						\$3,148.15
	Cost per family.....			\$45.60	\$16.56	\$45.43	\$102.28						\$209.87
604	Portsmouth, N. H. (Kittery, Me.):												
	Quantity.....	0	0	1,350	3,168	×	10,782	33	965	0	0	64	
	Cost.....			\$2,025.00	\$1,267.20		\$2,695.50	\$66.00	\$482.50			\$448.00	\$6,981.20
	Cost per family.....			\$31.64	\$19.80		\$42.11	\$1.03	\$7.54			\$7.00	\$109.12
2728	Portsmouth, Ohio (second site):												
	Quantity.....	0	0	4,741	×	×	69,903	0	0	0	0	192	
	Cost.....			\$7,111.50			\$17,475.75					\$1,344.00	\$25,931.25
	Cost per family.....			\$37.04			\$91.02					\$7.00	\$135.06
241	Puget Sound Navy Yard (Bremerton), Wash., inside.												
	Quantity.....	114	233	3,932	19,500	20,080	61,017	×	×	0	0	295	
	Cost.....	\$228.00	\$466.00	\$5,898.00	\$7,800.00	\$10,040.00	\$15,254.25					\$2,065.00	\$41,751.25
	Cost per family.....	\$0.77	\$1.58	\$19.99	\$26.10	\$34.04	\$51.71					\$7.00	\$141.19
62	Quincy, Mass.:												
	Arnold Street—												
	Quantity.....	0	0	1,744	×	×	54,450	144	3,887	0	0	127	
	Cost.....			\$2,616.00			\$13,612.50	\$288.00	\$1,943.50			\$889.00	\$19,449.00
	Cost per family.....			\$20.60			\$107.19	\$2.27	\$17.30			\$7.00	\$152.36
	Baker Yacht Basin—												
	Quantity.....	0	0	4,649	×	×	53,845	121	3,661	0	0	236	
	Cost.....			\$6,973.50			\$13,461.25	\$242.00	\$1,830.50			\$1,652.00	\$24,159.25
	Cost per family.....			\$29.55			\$57.04	\$1.03	\$7.76			\$7.00	\$102.38
	River Street—												
	Quantity.....	0	0	1,014	×	×	21,780	86	1,006	0	0	60	
	Cost.....			\$1,521.00			\$5,445.00	\$172.00	\$953.00			\$420.00	\$8,511.00
	Cost per family.....			\$25.35			\$90.75	\$2.87	\$15.88			\$7.00	\$141.85
246a	Rock Island district:												
	Davenport, Ia.—												
	King—												
	Quantity.....	0	0	1,620	6,000	6,000	28,690	600	2,520	0	0	120	
	Cost.....			\$2,430.00	\$2,400.00	\$3,000.00	\$7,172.50	\$1,200.00	\$1,260.00			\$40.00	\$18,302.50
	Cost per family.....			\$20.25	\$20.00	\$25.00	\$59.77	\$10.00	\$10.50			\$7.00	\$152.52
	McManus—												
	Quantity.....	0	0	3,106	9,872	9,738	66,717	1,190	4,998	0	0	208	
	Cost.....			\$4,659.00	\$3,948.50	\$4,689.00	\$16,679.25	\$2,380.00	\$2,499.00			\$1,876.00	\$36,911.05
	Cost per family.....			\$17.45	\$14.75	\$18.24	\$62.23	\$8.91	\$9.36			\$7.00	\$137.94
	Park Lane—												
	Quantity.....	0	0	1,228	4,360	4,550	22,010	455	1,911	0	0	91	
	Cost.....			\$1,842.00	\$1,744.00	\$2,275.00	\$5,502.50	\$910.00	\$935.50			\$637.00	\$13,866.00
	Cost per family.....			\$20.13	\$19.16	\$25.00	\$60.47	\$10.00	\$10.50			\$7.00	\$152.26
246b	Moline, Ill.—												
	Quantity.....	0	0	1,530	5,660	4,614	33,319	450	1,890	0	0	117	
	Cost.....			\$2,295.00	\$2,264.00	\$2,307.00	\$8,329.75	\$900.00	\$945.00			\$819.00	\$17,859.75
	Cost per family.....			\$19.61	\$10.80	\$19.72	\$71.19	\$7.69	\$8.07			\$7.00	\$144.08
246c	East Moline, Ill.—												
	Deere—												
	Quantity.....	0	0	364	1,480	1,500	8,578	135	567	0	0	27	
	Cost.....			\$546.00	\$592.00	\$750.00	\$2,144.50	\$270.00	\$283.50			\$189.00	\$4,775.00
	Cost per family.....			\$20.22	\$21.90	\$27.77	\$79.43	\$10.00	\$10.50			\$7.00	\$196.82
	Highlands—												
	Quantity.....	0	0	1,337	4,080	4,080	29,428	195	2,079	0	0	99	
	Cost.....			\$2,005.50	\$2,040.00	\$2,040.00	\$7,357.00	\$390.00	\$1,039.50			\$693.00	\$13,525.00
	Cost per family.....			\$20.27	\$20.61		\$74.31	\$3.94	\$10.50			\$7.00	\$156.63
246e	Rock Island, Ill.—												
	Quantity.....	0	0	2,947	10,000	9,500	53,667	900	3,780	0	0	217	
	Cost.....			\$4,420.50	\$4,000.00	\$4,750.00	\$13,416.75	\$1,800.00	\$1,890.00			\$1,519.00	\$31,796.25
	Cost per family.....			\$20.42	\$18.11	\$21.89	\$61.83	\$8.29	\$8.71			\$7.00	\$146.58
136	Seven Pines, Va.:												
	Quantity.....	6,090	0	11,307	43,000	40,000	37,979	1,138	18,212	2,000	0	863	
	Cost.....	\$12,180.00		\$16,960.50	\$17,200.00	\$20,000.00	\$9,194.75	\$2,276.00	\$9,106.00	\$600.00		\$6,041.00	\$93,838.25
	Cost per family.....	\$14.11		\$19.65	\$20.00	\$23.18	\$11.00	\$2.64	\$10.55	\$0.70		\$7.00	\$108.83
13	Sharon, Pa.:												
	Quantity.....	0	0	3,833	12,363	10,870	57,589	0	1,700	0	0	215	
	Cost.....			\$5,749.50	\$4,945.20	\$5,435.00	\$14,397.25		\$850.00			\$1,505.00	\$32,881.95
	Cost per family.....			\$26.74	\$23.00	\$23.28	\$66.96		\$3.95			\$7.00	\$152.93
1733	South Bend, Ind.:												
	Quantity.....	0	0	2,433	9,424	9,092	76,530	0	4,950	0	0	186	
	Cost.....			\$3,649.50	\$3,769.60	\$4,746.00	\$19,132.50		\$2,475.00			\$1,302.00	\$34,874.60
	Cost per family.....			\$19.62	\$20.27	\$24.44	\$102.86		\$13.31			\$7.00	\$187.50
130	Staten Island, N. Y.:												
	Apartments—												
	Quantity.....	0	0	103	52	44	2,900	0	34	570	0	0	
	Cost.....			\$154.50	\$20.50	\$22.00	\$725.00		\$17.00	\$171.00			\$1,110.30
	Cost per family.....			\$4.29	\$0.58	\$0.61	\$20.14		\$0.47	\$4.75			\$30.84
	Houses—												
	Quantity.....	0	0	1,404	3,682	4,265	16,800	72	432	11,296	0	78	
	Cost.....			\$2,106.00	\$1,472.80	\$2,132.50	\$4,200.00	\$144.00	\$216.00	\$4,388.80		\$746.00	\$14,206.10
	Cost per family.....			\$27.00	\$18.88	\$27.34	\$53.84	\$1.84	\$2.77	\$43.45		\$7.00	\$182.12

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TABLE X.—Lot improvements, excluding buildings—Continued.

No.	Project.	Common roadways.	Common walks.	House walks.	House connections		Preparing lawns.	Lot trees.	Shrubs and vines.	Hedge.	Fence.	Clothes driers.	Total.
					Sewer.	Water.							
	Unit cost.....	Sq. yds. \$2.00	Sq. yds. \$2.00	Sq. yds. \$1.50	Lin. ft. \$0.40	Lin. ft. \$0.50	Sq. yds. \$0.25			Lin. ft. \$0.30	Lin. ft. \$0.75	\$7.00	
118	Warren, Ohio:												
	Northeast—												
	Quantity.....	0	0	1,317	2,700	2,784	5,846	0	240	0	0	52	
	Cost.....			\$1,975.50	\$1,080.00	\$1,392.00	\$1,461.50		\$120.00			\$364.00	\$6,393.00
	Cost per family.....			\$37.99	\$20.77	\$26.77	\$28.11		\$2.31			\$7.00	\$122.95
	Southeast—												
	Quantity.....	0	0	1,096	2,400	2,462	10,243	0	910	0	0	47	
	Cost.....			\$1,644.00	\$960.00	\$1,231.00	\$2,560.75		\$455.00			\$329.00	\$7,179.25
	Cost per family.....			\$34.98	\$20.42	\$26.19	\$54.48		\$9.68			\$7.00	\$152.75
	Washington, D. C., district:												
	Navy Yard—												
27a	Apartment—												
	Quantity.....	0	1,306	1,230	2,435	2,865	5,130	0	0	0	410	0	
	Cost.....		\$2,612.00	\$1,845.00	\$974.00	\$1,432.50	\$1,282.50				\$307.50		\$8,453.50
	Cost per family.....		\$8.48	\$4.16	\$3.16	\$4.65	\$4.16				\$1.00		\$25.61
27b	Houses—												
	Quantity.....	0	0	6,584	10,578	10,200	33,893	0	672	3,330	23,463	274	
	Cost.....			\$9,876.00	\$4,231.20	\$5,100.00	\$8,473.25		\$336.00	\$999.00	\$17,597.25	\$1,918.00	\$48,530.70
	Cost per family.....			\$36.04	\$15.44	\$18.61	\$30.92		\$1.23	\$3.65	\$64.22	\$7.00	\$177.11
34c	Residence Halls—												
	Twenty-first and B Streets—												
	Quantity.....	0	2,087	405	6,784	1,728	9,468	0	×	0	659	0	
	Cost.....		\$4,174.00	\$607.50	\$2,713.60	\$864.00	\$2,367.00				\$494.25		\$11,220.35
	Cost per family.....		\$12.42	\$1.80	\$8.08	\$2.57	\$7.94				\$1.48		\$33.39
54f	Bureau of Standards—												
	Quantity.....	762	995	132	571	286	9,798	✓	✓	0	0	0	
	Cost.....	\$1,524.00	\$1,990.00	\$198.00	\$228.40	\$143.00	\$2,449.50						\$6,532.90
	Cost per family.....	\$14.94	\$19.51	\$1.94	\$2.24	\$1.40	\$24.01						\$14.04
54g	South Capitol Street—												
	Quantity.....	0	0	2,107	3,550	3,150	7,446	16	120	0	7,924	291	
	Cost.....			\$3,160.50	\$1,420.00	\$1,575.00	\$1,861.50	\$32.00	\$60.00		\$5,943.00	\$1,407.00	\$15,459.00
	Cost per family.....			\$15.72	\$7.07	\$7.84	\$9.26	\$0.16	\$0.30		\$29.56	\$7.00	\$76.91
54h	Steel & Ordnance Co.—												
	Quantity.....	0	0	421	3,290	2,130	16,700	54	300	0	5,721	74	
	Cost.....			\$631.50	\$1,316.00	\$1,065.00	\$4,175.00	\$108.00	\$150.00		\$4,290.75	\$518.00	\$12,254.25
	Cost per family.....			\$8.33	\$17.78	\$14.39	\$56.42	\$1.45	\$2.03		\$57.98	\$7.00	\$165.58
380	Waterbury, Conn.:												
	Chase—												
	Quantity.....	0	0	1,343	3,106	3,142	21,040	160	1,045	0	0	70	
	Cost.....			\$2,014.50	\$1,242.40	\$1,571.00	\$7,260.00	\$320.00	\$322.50			\$490.00	\$13,120.40
	Cost per family.....			\$28.78	\$17.75	\$22.44	\$103.71	\$4.57	\$7.47			\$7.00	\$191.72
	Sylvan Avenue—												
	Quantity.....	0	0	2,260	6,000	5,531	38,720	276	1,371	0	0	135	
	Cost.....			\$3,399.00	\$2,400.00	\$2,765.50	\$9,680.00	\$352.00	\$683.50			\$945.00	\$20,427.00
	Cost per family.....			\$25.18	\$17.78	\$20.48	\$71.70	\$4.09	\$5.08			\$7.00	\$151.31
389	Watertown, N. Y.:												
	Quantity.....	0	0	5,150	7,500	16,000	228,400	302	2,800	7,500	0	302	
	Cost.....			\$7,725.00	\$3,000.00	\$8,000.00	\$56,600.00	\$604.00	\$1,400.00	\$2,250.00		\$2,114.00	\$81,693.00
	Cost per family.....			\$25.58	\$9.93	\$26.49	\$187.05	\$2.00	\$4.63	\$7.45		\$7.00	\$270.13
151	Watervliet (Troy), N. Y.:												
	Quantity.....	0	0	2,077	4,650	5,650	20,134	0	777	0	0	91	
	Cost.....			\$3,115.50	\$1,860.00	\$2,825.00	\$5,033.50		\$388.50			\$637.00	\$13,859.50
	Cost per family.....			\$34.24	\$29.44	\$31.04	\$15.32		\$4.27			\$7.00	\$152.81
	Total, 97 sites, 21,005 families (where quantities are unknown, X, average of all others is added):												
	Quantity.....	17,831	25,183	282,576	691,802	789,114	4,322,000	20,337	254,393	379,639	533,445	18,297	
	Cost.....	\$35,952.00	\$50,366.00	\$423,806.50	\$280,124.80	\$394,557.00	\$1,105,502.35	\$40,674.00	\$127,196.50	\$107,891.70	\$390,083.75	\$128,079.00	\$3,104,420.10
	Cost per family.....	\$1.70	\$2.44	\$20.79	\$13.34	\$18.78	\$52.63	\$1.94	\$6.06	\$5.14	\$18.57	\$17.00	\$147.80

1 Rate based on 18,297 families.



TABLE XI.—Summary of costs assumed for comparison of projects for housing families.

The cost of "Land" (A) is the actual price where it was purchased or contracted for, and the appraised value in all other cases. On certain projects as noted, where the land either already belonged to the Government or was donated for the housing, an assumed value for the land has been set in accord with prevailing values of unimproved land. In cases where the land purchased or contracted for did not coincide with the land planned, the cost of the "Land planned for development" (A) was found by adding to the price of those parcels wholly used proportionate values for the fractions of parcels partly used. Obviously the value of local improvements made previous to the purchase of the land is reflected in the land value; therefore the value of these, determined in the same way as other improvements, is deducted to get the value of the "Bare land" (B).

To facilitate the comparison of different project plans the cost assumed for "Houses" (E) is found by multiplying the total cubage of all houses planned by a uniform cubage rate. In arriving at the grand total or gross cost the cost assumed for "Buildings other than houses" (I) is also based on uniform cubage rates for each type of building.

No.	Project.	A. Land planned for development.	B. Bare land, excluding value of previous improvements.	C. General improvements directly chargeable (including previous improvements) (Table 7).	D. Lot improvements, excluding buildings (Table 10).	E. Houses assumed at 30 cents per cubic foot).	F. Total for land and improvements directly chargeable (B., C., D., and E.).	G. General improvements, cost to be refunded (Table 8).	H. General improvements, outside of project (Table 9).	I. Buildings other than houses (assumed at uniform cubage rates).	Gross total (F., G., H., and I).
56	Aberdeen, Md.: Cost.....	\$13,830.00	\$13,830.00	\$24,001.00	\$15,181.30	\$453,914.20	\$506,926.50	\$6,165.90	\$12,800.00		\$525,892.40
	Cost per family.....	172.88	172.88	300.02	189.77	5,673.93	6,336.60	77.07	160.00		6,573.07
185	Alabama nitrate district: Florence— Cost.....	38,000.00	38,000.00	87,249.15	35,864.00	500,466.60	661,579.75				661,579.75
	Cost per family.....	308.94	308.94	708.54	291.65	4,068.84	5,377.97				5,377.97
597	Sheffield— Cost.....	30,000.00	30,000.00	84,000.95	39,746.50	456,255.00	610,096.50				610,096.50
	Cost per family.....	263.16	263.16	738.17	349.10	4,037.60	5,388.03				5,388.03
1165	Tusculum— Cost.....	3,750.00	3,750.00	28,467.30	17,339.00	210,925.00	260,481.30				260,481.30
	Cost per family.....	72.11	72.11	547.44	333.44	4,056.30	5,009.29				5,009.29
621	Alliance, Ohio: Northwest— Cost.....	11,760.00	11,760.00	22,141.75	9,334.75	240,815.70	284,052.20	8,150.00	4,100.00		301,311.49
	Cost per family.....	226.15	226.15	425.44	180.27	4,631.07	5,462.93	154.44	78.84		5,596.21
	Southeast— Cost.....	83,500.00	83,500.00	96,854.00	35,360.50	988,980.00	1,204,694.50	34,294.60	2,926.00		1,241,915.10
	Cost per family.....	392.01	392.01	434.67	166.00	4,642.00	5,654.68	175.87	13.74		5,844.29
554	Alton, Ill.: Broadway Cost.....	20,587.00	20,587.00	23,352.25	11,121.50	958,118.40	1,013,179.15	634.50			1,013,813.65
	Cost per family.....	428.75	428.75	534.78	265.27	19,960.80	21,189.60	28.84			21,218.44
	East Alton Cost.....	3,200.00	3,200.00	8,936.25	5,227.70	56,976.60	74,340.55	2,138.00			76,478.55
	Cost per family.....	213.33	213.33	595.61	348.51	3,798.44	4,955.89	142.53			5,098.42
	Milton Hill— Cost.....	48,080.00	48,080.00	170,250.25	57,075.00	1,165,029.60	1,440,434.85	19,518.50		\$185,940.00	1,645,893.35
	Cost per family.....	169.29	169.29	595.99	200.93	4,102.22	5,068.43	72.25		634.72	5,795.40
59	Bath, Me.: Cost.....	7,750.00	7,140.00	26,892.25	21,369.05	378,638.40	434,039.70	9,816.51	5,217.50		449,073.71
	Cost per family.....	86.11	79.33	298.12	237.43	4,207.09	4,822.47	133.29	57.90		5,013.72
24	Bethlehem, Pa.: Cost.....	256,200.00	256,200.00	474,014.50	263,088.00	6,633,664.50	7,626,967.00	83,752.00	73,100.00	522,422.00	8,306,241.00
	Cost per family.....	203.66	203.66	377.78	209.23	5,273.18	6,063.85	66.70	58.12	415.29	6,603.96
102	Bridgeport, Conn.: Houses Black Rock (1) Cost.....	62,850.00	60,575.00	21,313.25	11,571.80	707,369.40	800,829.45	6,976.00			807,805.45
	Cost per family.....	290.97	280.44	98.68	53.57	3,274.86	3,707.55	32.25			3,739.80
	Connecticut Avenue (14) Cost.....	28,978.00	27,467.00	13,159.00	6,483.40	343,796.40	390,905.80	3,901.60			394,807.40
	Cost per family.....	268.31	254.32	121.84	60.11	3,183.30	3,619.57	36.14			3,655.71
	Crane (4)— Cost.....	105,000.00	99,476.00	69,531.40	59,817.75	1,359,430.80	1,588,255.95	19,523.00			1,607,778.95
	Cost per family.....	278.51	263.86	187.06	158.65	3,606.00	4,215.57	51.79			4,267.38
	Grasmere (12)— Cost.....	46,350.00	41,464.00	22,141.00	17,689.00	503,448.60	584,742.60	7,700.40			592,443.00
	Cost per family.....	461.09	410.53	218.51	175.21	4,984.64	5,788.89	76.24			5,865.13
	Mill Green (5)— Cost.....	45,410.00	42,631.00	35,465.00	28,379.66	509,052.60	615,528.25	11,891.40			629,419.66
	Cost per family.....	409.09	384.06	321.66	246.65	4,490.56	5,442.93	125.06			5,567.99
	Mill Green Cemetery Extension Cost.....	27,000.00	27,000.00	22,779.50	15,933.05	442,311.60	508,024.15	9,016.00			517,040.15
	Cost per family.....	281.25	281.25	237.29	166.39	4,607.42	5,292.35	94.95			5,387.30
102a	Temporary Flats, Cemetery Site Cost.....	17,000.00	15,374.00	21,093.50	10,700.00	506,446.80	553,614.30	5,213.00			558,827.30
	Cost per family.....	80.19	72.52	99.50	50.47	2,388.90	2,611.39	24.54			2,635.93
	Hill Top— Cost.....	16,900.00	16,900.00	18,081.40	11,474.00	449,113.20	495,568.60	3,459.00			499,027.60
	Cost per family.....	89.90	89.90	96.18	61.03	2,388.89	2,636.00	18.34			2,654.34
456	Butler, Pa.: Cost.....	41,450.00	41,450.00	57,734.75	34,987.25	823,487.40	957,659.40	20,594.20			978,253.60
	Cost per family.....	248.20	248.20	349.67	209.48	4,930.80	5,738.15	164.82			5,902.97
565	Charleston, S. C.: Cost.....	34,170.00	34,170.00	60,480.50	19,547.00	787,270.00	901,467.50	10,439.60	6,050.00	28,250.00	946,207.10
	Cost per family.....	219.04	219.04	387.70	125.90	5,046.80	5,779.44	66.93	38.79	181.09	6,066.25
18	Charleston, W. Va.: Cost.....	148,840.00	45,946.00	62,835.50	15,623.50	361,843.20	486,248.20	13,068.00	658.00		499,974.20
	Cost per family.....	561.40	528.11	722.22	178.66	4,159.10	5,588.09	150.22	7.56		5,745.87
1635	Chester, Pa.: Eddystone— Cost.....	118,467.00	115,501.00	207,346.50	73,180.85	2,484,800.00	2,880,828.35	35,964.20	3,491.50	268,000.00	3,188,284.05
	Cost per family.....	204.25	199.14	357.38	142.38	4,284.10	4,983.00	62.00	6.02	462.07	5,513.09
2947	Ridley Park— Cost.....	65,000.00	63,922.00	164,359.00	85,817.00	2,750,462.70	3,039,560.70	13,935.00		288,427.00	3,341,922.70
	Cost per family.....	115.04	113.13	291.15	151.89	4,888.08	5,424.25	24.84		510.49	5,959.58

¹ Nominal cost.

TABLE XI.—Summary of costs assumed for comparison of projects for housing families—Continued.

No.	Project.	A. Land planned for development.	B. Bare land, excluding value of previous improvements.	C. General improvements directly chargeable including previous improvements (Table 7).	D. Lot improvements, excluding buildings (Table 10).	E. Houses at 30 cents per cubic foot).	F. Total for land and improvements directly chargeable (B., C., D., and E.).	G. General improvements, cost to be refunded (Table 8).	H. General improvements outside of project (Table 9).	I. Buildings other than houses (assumed at uniform cubage rates).	Gross total (F., G., H., and I).
243	Dayton, Ohio: Edgemont—										
	Cost	\$186,000.00	\$144,995.00	\$349,797.50	\$85,680.00	\$2,748,506.70	\$3,228,979.20	\$70,635.50	\$32,990.00		\$3,332,604.70
	Cost per family	236.34	184.23	444.27	108.86	3,492.38	4,229.40	89.63	41.93		4,360.96
	Leo Street—										
	Cost	14,530.00	9,740.00	10,392.50	4,776.00	134,176.80	159,085.30	4,729.00			163,814.30
	Cost per family	363.25	243.50	269.82	119.40	3,354.42	3,987.14	118.25			4,105.39
244a	Elizabeth, N. J.: Site A—										
	Cost	12,600.00	6,244.00	19,784.75	13,713.80	209,780.40	249,511.90	5,513.00			255,024.90
	Cost per family	252.00	124.68	395.68	274.28	4,195.61	4,960.25	100.26			5,090.51
	Site B—										
	Cost	39,120.00	18,612.00	38,286.00	15,787.00	373,386.80	446,071.80	4,690.00			450,761.80
	Cost per family	376.15	178.96	368.14	151.73	3,590.26	4,289.09	45.09			4,334.18
	Site D—										
	Cost	22,755.00	19,415.00	20,866.23	13,490.30	209,867.40	263,638.93	3,847.00			267,485.93
	Cost per family	455.10	388.30	417.33	269.81	4,197.35	5,272.79	76.99			5,349.78
10	Erie, Pa.: East—										
	Cost	31,200.00	18,882.00	86,459.50	47,442.65	1,086,267.90	1,239,052.05	13,233.60	\$10.00	\$24,223.00	1,277,348.65
	Cost per family	146.24	84.67	387.72	212.71	4,871.16	5,556.26	59.91	3.78	108.62	5,728.57
	West—										
	Cost	166,000.00	163,032.00	147,093.50	101,118.50	2,203,611.60	2,614,855.60	27,632.00	11,890.00	30,432.00	2,684,809.60
	Cost per family	332.67	326.72	361.63	199.62	4,416.05	5,304.04	55.37	23.03	60.98	5,393.42
457	Hammond, Ind.: Cost	31,880.00	31,880.00	117,775.10	317,793.70	772,202.40	953,631.20	15,625.00			969,256.20
	Cost per family	183.20	183.20	676.76	218.34	4,515.80	5,394.10	90.00			5,684.10
578	Ilion, N. Y.: Cost	31,314.00	14,136.00	29,480.15	22,445.00	663,865.20	729,926.35	14,148.00			744,074.35
	Cost per family	203.33	91.79	186.35	142.85	4,310.80	4,731.79	91.90			4,823.69
1314	Indianapolis, Ind.: Cost	1,671.00	1,040.00	6,936.75	8,608.70	124,010.70	140,596.15	1,195.60			141,791.75
	Cost per family	75.95	47.27	239.62	355.66	5,636.85	6,279.40	24.93			6,304.35
496	Indianhead, Md.: Cost	180,130.00	61,778.00	181,736.50	40,181.04	713,520.00	1,002,215.54	20,671.20			1,022,886.74
	Cost per family	121.70	351.46	1,095.26	216.22	3,755.60	5,421.54	108.80			5,530.34
607	Kenilworth, N. J., Site E: Cost	10,780.00	10,780.00	10,268.50	8,447.75	207,394.80	233,891.05	1,285.20			238,176.25
	Cost per family	207.31	207.31	197.47	162.45	3,989.14	4,556.37	24.72			4,581.09
398a	Lowell, Mass.: Houses—										
	Hight Street Extension—										
	Cost	22,076.00	13,746.00	26,480.50	9,865.25	352,712.40	402,804.15	9,695.10			402,804.15
	Cost per family	265.98	165.61	317.56	117.72	4,249.55	4,850.44	114.16			4,964.60
	Livingston—										
	Cost	14,972.00	8,185.00	27,260.45	4,181.75	174,852.00	214,479.20	10,614.00			225,093.20
	Cost per family	374.30	204.62	681.51	104.54	4,371.30	5,361.97	265.32			5,627.29
2972	Lyles (Wrigley), Tenn.: Cost	126,830.00	26,830.00	59,521.00	45,249.00	426,459.00	558,059.00	12,880.10	8,045.00	63,996.00	642,980.10
	Cost per family	243.90	243.90	411.04	412.35	3,876.90	4,974.19	117.08	72.97	581.78	5,746.02
	Colored—										
	Cost	13,710.00	3,710.00	4,282.00	4,910.00	39,312.00	52,214.00	989.58	1,730.00		54,953.58
	Cost per family	247.33	247.33	285.50	327.33	2,620.80	3,480.96	65.84	108.00		3,654.80
581	Mare Island (Vallejo), Calif., Houses: Cost	21,452.00	21,452.00	193,516.00	39,320.25	1,446,039.30	1,700,327.55	44,176.56	19,425.00		1,763,929.11
	Cost per family	51.20	51.20	461.83	124.25	3,451.17	4,088.45	105.47	46.37		4,240.29
381	Milton, Pa.: Hepburn Street—										
	Cost	11,933.00	6,779.00	9,619.00	5,528.00	107,752.20	129,678.20	1,291.50			130,969.70
	Cost per family	497.21	282.46	400.80	230.34	4,499.67	5,403.27	54.42			5,457.69
	Site B—										
	Cost	16,600.00	10,026.00	36,820.50	10,119.00	286,120.50	343,085.50	4,221.20			347,306.70
	Cost per family	251.52	151.91	567.90	153.21	4,335.20	5,208.22	63.95			5,272.17
997	Muskegon, Mich.: McGraft—										
	Cost	39,760.00	39,760.00	84,885.00	11,506.69	1,434,330.00	1,570,481.69	13,856.00			1,584,337.69
	Cost per family	160.32	160.32	342.30	101.05	5,783.60	6,387.27	55.83			6,443.10
	Schoenberg—										
	Cost	5,250.00	5,250.00	13,479.00	3,934.00	170,331.60	192,994.60	3,372.70			196,367.30
	Cost per family	175.00	175.00	446.34	131.14	5,677.72	6,430.20	112.43			6,542.63
880	Neville Island, Pa., Cornapolis: Cost	37,070.00	34,710.00	26,376.00	14,240.00	394,021.50	469,347.50	9,772.20			479,119.70
	Cost per family	494.27	462.80	351.42	189.87	5,253.62	6,257.71	130.39			6,388.10
271	New Brunswick, N. J.: Cost	38,600.00	38,600.00	157,144.50	58,861.60	1,625,325.60	1,879,931.70	40,666.22	5,392.00	131,420.00	2,057,409.92
	Cost per family	97.23	97.23	395.60	148.28	4,094.62	4,735.73	103.08	15.44	331.03	5,185.28
1371	New Castle, Del.: Cost	3,520.00	2,620.00	18,459.00	5,936.00	225,795.00	252,810.00	9,962.50		29,000.00	291,772.50
	Cost per family	76.52	56.95	401.28	129.03	4,799.90	5,387.18	217.33		630.43	6,234.94
157	New London, Conn.: Cost	31,650.00	31,650.00	63,869.00	22,261.30	708,979.80	826,760.10	8,979.60	994.50		836,734.20
	Cost per family	194.15	194.15	391.80	136.55	4,319.50	5,072.00	55.11	6.09		5,133.20
	Groton: Cost	10,000.00	10,000.00	9,751.00	3,531.00	176,910.00	200,222.00	1,287.00			201,509.00
	Cost per family	400.00	400.00	390.04	141.24	4,423.50	5,354.78	51.48			5,406.26
722	New Orleans, La.: Cost	20,500.00	15,660.00	230,982.00	39,996.00	1,093,970.00	1,380,608.00	18,864.00	7,550.00	40,000.00	1,447,022.00
	Cost per family	98.09	74.92	1,105.12	191.36	5,234.40	6,605.80	90.26	36.13	191.39	6,923.58
382	Newport, R. I.: Cost	11,150.00	7,966.00	38,293.40	10,719.00	263,596.80	320,575.20	7,111.00			327,686.20
	Cost per family	163.97	117.15	563.12	157.62	3,876.41	4,714.30	104.56			4,818.86
	Jamestown—										
	Cost	2,625.00	1,659.00	9,323.00	2,525.00	45,254.40	58,761.40	959.00			59,720.40
	Cost per family	262.50	165.90	932.30	252.50	4,525.44	5,876.14	95.90			5,972.04

1 Nominal cost.

TABLE XI.—Summary of costs assumed for comparison of projects for housing families—Continued.

No.	Project.	A. Land planned for development.	B. Bare land, excluding value of previous improvements.	C. General improvements directly chargeable (including previous improvements) (Table 7).	D. Lot improvements, excluding buildings (Table 10).	E. Houses (assumed at 30 cents per cubic foot).	F. Total for land and improvements directly chargeable (B., C., D., and E.).	G. General improvements, cost to be refunded (Table 8).	H. General improvements outside of project (Table 9).	I. Buildings other than houses (assumed at uniform cubage rates).	Gross total (F., G., H., and I.).
57a	Newport News, Va.: Hilton Extension										
	Cost.....	\$28,990.00	\$24,724.00	\$108,010.75	\$14,580.75	\$1,802,040.00	\$1,949,355.50	\$9,070.00		\$205,847.00	\$2,164,272.50
	Cost per family.....	62.35	53.17	232.28	207.19	3,883.10	4,375.74	18.72		443.97	4,838.43
57c	Briarfield—										
	Cost.....	40,110.00	40,110.00	143,149.50	46,405.50	1,840,087.80	2,690,752.80	44,645.00	\$15,285.00	452,856.00	3,203,538.80
	Cost per family.....	72.92	72.92	264.06	84.36	3,345.61	3,766.95	81.00	27.79	823.37	4,699.11
404	Niagara Falls, N. Y.: Site A—										
	Cost.....	57,653.00	49,988.00	82,374.00	44,056.20	543,975.00	720,393.20	6,535.00			726,928.20
	Cost per family.....	433.48	375.85	619.35	350.50	4,090.10	5,435.80	49.12			5,484.92
	Site B—										
	Cost.....	77,860.00	60,860.00	81,035.00	42,267.00	763,040.00	947,202.00	15,049.00			962,251.00
	Cost per family.....	389.30	304.30	405.21	211.30	3,815.20	4,736.01	75.25			4,811.26
	Site C—										
	Cost.....	12,625.00	12,625.00	36,251.50	16,895.00	258,188.40	323,959.90	3,181.00	1,750.00		328,890.90
	Cost per family.....	185.66	185.66	536.02	248.48	3,795.40	4,765.56	46.79	25.72		4,838.07
481	Niles, Ohio: Cost.....	21,400.00	20,072.00	76,853.00	19,804.00	482,622.20	599,358.20	17,038.00	1,250.00		617,646.20
	Cost per family.....	182.90	171.56	660.11	170.13	4,125.02	5,127.12	149.46	10.96		5,287.54
	Norfolk district: Cradock, Va.—										
150a	Cost.....	85,000.00	77,267.00	430,188.31	116,548.75	4,461,000.00	5,085,004.06	198,581.10	34,618.50	676,000.00	5,994,233.66
	Cost per family.....	69.27	62.57	425.05	94.43	3,612.10	4,194.15	161.08	28.10	547.21	4,930.54
150b	Glenwood Park, Va.—										
	Cost.....	168,000.00	168,000.00	136,168.25	54,473.00	2,084,340.90	2,442,982.15	62,463.86	1,224.00	35,000.00	2,541,670.01
	Cost per family.....	239.25	239.25	214.37	84.06	3,215.10	3,772.78	96.24	1.89	54.01	3,924.92
150	Truxton, Va.										
	Cost.....	33,600.00	27,160.00	75,866.00	68,465.25	615,107.40	786,598.65	56,677.80	14,495.00	280,640.00	1,138,411.45
	Cost per family.....	132.81	107.35	299.85	270.61	2,431.25	3,109.06	223.99	57.30	1,109.25	4,499.60
60	Pensacola, Fla.: Cost.....	17,060.00	7,060.00	63,774.50	21,848.00	679,750.00	772,432.50	17,811.00	21,845.00	28,000.00	840,088.50
	Cost per family.....	52.30	52.30	472.92	161.84	5,035.20	5,722.26	131.95	161.82	207.41	6,223.40
471	Perth Amboy, N. J.: Cost.....	14,000.00	44,000.00	33,383.00	10,552.20	333,213.80	521,149.00	2,151.80			523,300.80
	Cost per family.....	282.05	282.05	214.00	67.64	2,777.01	3,340.70	13.77			3,354.47
503	Philadelphia, Pa.: Navy yard, Oregon Avenue										
	Cost.....	355,600.00	355,600.00	385,835.75	41,077.00	3,249,065.00	4,031,597.75	38,587.40		32,984.00	4,103,169.15
	Cost per family.....	510.91	510.91	554.28	59.00	4,668.19	5,792.38	55.42		47.39	5,895.19
153b	Tacony—										
	Cost.....	49,480.00	40,476.00	108,830.25	28,133.00	1,130,173.20	1,307,612.45	9,423.00			1,317,035.45
	Cost per family.....	184.63	151.03	406.08	104.97	1,194.66	4,856.74	35.15			4,891.89
2125	Pompton Lakes, N. J.: Cost.....	4,375.00	4,375.00	3,322.25	3,145.15	53,863.50	64,705.90	587.60			65,293.50
	Cost per family.....	291.67	291.67	221.48	209.87	3,657.57	4,380.59	39.17			4,419.76
601	Portsmouth N. H. (Kittery, Me.): Cost.....	17,000.00	17,000.00	25,608.25	6,984.20	288,604.80	338,197.25	1,860.30	5,500.00		345,557.55
	Cost per family.....	265.62	265.62	400.41	109.12	4,509.45	5,284.60	29.07	85.94		5,399.61
2728	Portsmouth, Ohio (second site): Cost.....	166,540.00	121,822.00	62,239.75	25,931.25	691,200.00	901,193.00	9,359.60			910,552.60
	Cost per family.....	867.40	634.50	324.10	135.00	3,600.00	4,693.60	48.75			4,742.35
241	Puget Sound Navy Yard (Bremer- ton) Wash., Inside: Cost.....	160,287.00	53,707.00	139,389.37	41,751.25	1,076,750.00	1,311,097.62	25,500.00			1,336,597.62
	Cost per family.....	543.35	182.06	472.70	141.19	3,650.00	4,445.95	86.44			4,532.39
62	Quincy, Mass.: Arnold Street—										
	Cost.....	34,520.00	29,422.00	61,976.25	19,349.00	529,842.90	640,589.15	14,601.48			655,190.63
	Cost per family.....	271.81	231.67	487.96	152.36	4,172.30	5,044.29	115.05			5,159.34
	Baker Yacht Basin										
	Cost.....	91,987.00	86,851.00	102,833.95	24,159.25	1,017,955.80	1,231,800.00	13,366.68	770.00		1,245,936.68
	Cost per family.....	389.78	368.01	435.71	102.38	4,313.38	5,219.48	56.03	3.26		5,280.39
	River Street—										
	Cost.....	40,512.00	34,786.00	30,386.60	8,511.00	276,260.40	349,944.00	12,021.46			361,965.46
	Cost per family.....	675.20	579.77	306.55	141.85	4,682.38	5,910.55	200.37			6,110.92
246c	Rock Island district: Davenport, Iowa—										
	King—										
	Cost.....	30,742.00	30,742.00	38,098.13	18,302.50	509,010.90	596,153.53	8,199.00			604,352.53
	Cost per family.....	256.18	256.18	317.47	152.52	4,241.75	4,967.92	68.33			5,036.25
	McManus—										
	Cost.....	78,244.00	78,244.00	153,513.75	36,911.05	1,076,250.00	1,344,918.80	17,232.00	6,541.00		1,368,691.80
	Cost per family.....	293.05	293.05	575.12	137.94	4,030.10	5,036.21	64.54	24.50		5,125.25
	Park Lane—										
	Cost.....	15,479.00	12,649.00	40,219.80	13,866.00	368,974.50	435,700.30	7,664.80			443,365.10
	Cost per family.....	170.10	139.00	441.84	152.26	4,054.60	4,787.70	84.22			4,871.92
246a	Moline, Ill.: Cost.....	49,702.00	38,283.00	55,962.25	17,859.75	480,576.70	592,681.70	11,782.00			604,463.70
	Cost per family.....	424.80	327.20	478.30	144.08	4,107.49	5,057.07	100.71			5,157.78
246b	East Moline, Ill.—										
	Deere—										
	Cost.....	10,230.00	9,208.00	9,319.00	4,775.00	111,458.40	134,760.40	6,774.00			141,534.40
	Cost per family.....	378.89	341.04	345.13	196.82	4,128.10	5,011.09	250.85			5,261.94
	Highlands—										
	Cost.....	37,000.00	30,880.00	37,875.05	13,525.00	403,278.90	485,558.95	8,336.40			493,895.35
	Cost per family.....	373.74	311.82	382.32	136.63	4,073.53	4,904.30	84.22			4,988.52
246e	Rock Island, Ill.—										
	Cost.....	93,551.00	87,206.00	73,492.45	31,796.25	924,210.60	1,116,705.30	17,993.80			1,134,699.10
	Cost per family.....	431.11	401.41	338.67	146.58	4,259.05	5,145.71	82.89			5,228.60

¹ Nominal cost.

TABLE XI.—Summary of costs assumed for comparison of projects for housing families—Continued.

No.	Project.	A. Land planned for development.	B. Bare land, excluding value of previous improvements.	C. General improvements, directly chargeable (including previous improvements) (Table 7).	D. Lot improvements, excluding buildings (Table 10).	E. Houses (assumed at 30 cents per cubic foot).	F. Total for land and improvements directly chargeable (B., C., D., and E.).	G. General improvements, cost to be refunded (Table 8).	H. General improvements outside of project (Table 9).	I. Buildings other than houses (assumed at uniform cubage rates).	Gross total (F., G., H., and I).
1368	Seven Pines, Va.:										
	Cost.....	\$26,494.00	\$26,494.00	\$455,191.65	\$93,858.25	\$4,110,946.50	\$4,685,490.40	\$46,900.00		\$570,043.00	\$5,303,433.40
	Cost per family.....	30.68	30.68	527.55	108.83	4,698.20	5,365.26	54.34		660.53	6,080.13
138	Sharon, Pa.:										
	Cost.....	19,597.00	19,597.00	170,049.80	32,881.95	947,800.00	1,170,328.75	12,636.00			1,182,964.75
	Cost per family.....	91.15	91.15	790.72	152.93	4,408.40	5,433.20	59.05			5,502.25
1535	South Bend, Ind.:										
	Cost.....	61,150.00	48,877.00	180,008.00	34,874.60	1,064,955.60	1,328,715.20	21,445.40	\$1,960.00		1,352,120.60
	Cost per family.....	328.76	262.78	972.51	187.50	5,725.57	7,148.36	115.55	4.52		7,268.43
130	Staten Island, N. Y.:										
	Apartments—										
	Cost.....	6,750.00	5,178.00	2,534.00	1,110.30	84,672.00	93,494.30	406.88			93,901.18
	Cost per family.....	187.50	172.60	73.18	30.84	2,352.00	2,628.62	11.31			2,639.93
	Houses—										
	Cost.....	18,000.00	15,725.00	33,378.75	14,206.10	234,991.85	298,301.70	9,662.08	5,589.50		313,553.28
	Cost per family.....	230.77	201.60	427.93	182.12	3,012.70	3,824.35	123.84	71.64		4,019.83
118	Warren, Ohio:										
	Northeast—										
	Cost.....	12,500.00	12,500.00	20,530.25	6,393.00	219,200.00	258,623.25	1,702.40			260,325.65
	Cost per family.....	240.38	240.38	394.82	122.95	4,215.40	4,973.55	32.74			5,006.29
	Southeast—										
	Cost.....	13,150.00	13,150.00	19,329.30	7,179.25	202,978.80	242,637.35	3,821.76			246,459.11
	Cost per family.....	279.79	279.79	693.64	152.75	4,318.70	5,444.88	81.44			5,526.32
	Washington, D. C., district:										
	Navy Yard—										
	Apartments—										
	Cost.....	73,544.00	70,771.00	144,707.25	8,453.50	1,504,013.40	1,727,945.15	11,930.00	2,975.00		1,742,850.15
	Cost per family.....	238.78	229.13	469.83	25.61	4,883.16	5,607.73	37.16	4.14		5,649.03
27b	Houses—										
	Cost.....	86,216.00	63,757.00	125,366.55	48,530.70	1,555,069.80	1,792,724.05	16,971.00			1,809,695.05
	Cost per family.....	314.58	232.69	457.61	177.11	5,675.44	6,542.85	62.27			6,605.12
54c	Residence Halls—										
	Twenty-first and B Streets										
	Cost.....	100,560.00	90,282.00	27,151.30	11,220.35	957,600.00	1,086,253.65	6,096.76			1,092,350.41
	Cost per family.....	299.28	268.69	80.45	33.39	2,850.00	3,232.53	18.09			3,250.62
54f	Bureau of Standards										
	Cost.....	32,270.00	31,010.00	8,048.00	6,532.90	430,601.10	476,192.00	1,115.90			477,307.90
	Cost per family.....	316.37	304.02	78.90	64.04	4,221.58	4,668.54	10.93			4,679.47
54g	South Capitol Street—										
	Cost.....	23,048.00	11,790.00	34,381.25	15,459.00	427,632.00	489,262.35	8,088.00		8,100.00	505,450.35
	Cost per family.....	114.67	58.66	195.60	76.91	2,127.54	2,458.71	40.24		40.29	2,539.24
549	Steel & Ordnance Co.—										
	Cost.....	13,208.00	6,486.00	34,092.75	12,254.25	369,902.40	422,735.40	4,528.00	7,500.00		434,763.40
	Cost per family.....	178.42	87.65	703.95	165.58	4,998.69	5,953.87	61.18	101.36		6,118.41
380	Waterbury, Conn.:										
	Chase—										
	Cost.....	6,585.00	6,585.00	32,174.00	13,420.40	326,859.00	379,038.40	3,736.80	11,422.00	1,085.00	395,282.20
	Cost per family.....	94.67	94.67	460.21	191.72	4,669.41	5,416.01	53.39	163.17	15.50	5,648.07
	Sylvan Avenue—										
	Cost.....	27,845.00	27,845.00	66,625.50	20,427.00	628,428.90	743,326.40	6,125.90	1,629.00	1,085.00	752,166.30
	Cost per family.....	206.25	206.25	493.47	151.31	4,655.03	5,506.06	45.35	12.02	8.04	5,571.47
389	Watertown, N. Y.:										
	Cost.....	79,939.00	78,277.00	100,442.50	81,693.00	1,256,227.50	1,516,640.00	26,640.00			1,543,280.00
	Cost per family.....	265.62	259.20	332.63	270.13	4,159.69	5,021.65	88.20			5,109.85
151	Watervliet (Troy), N. Y.:										
	Cost.....	25,750.00	12,409.00	41,597.90	13,859.50	366,727.50	434,593.90	9,221.00			443,814.90
	Cost per family.....	282.96	136.36	456.76	152.81	4,029.97	4,775.90	101.33			4,877.23
	Total, 97 sites, 21,005 families (including prorated costs where quantities are unknown, X):										
	Cost.....	4,498,503.00	4,035,900.00	8,282,058.50	3,104,420.10	91,890,653.45	107,802,932.05	1,839,855.08	331,623.50	3,903,750.00	112,388,260.63
	Cost per family.....	214.16	192.14	394.25	147.80	4,374.70	5,108.93	87.59	15.78	185.85	5,398.11





UNITED STATES DEPARTMENT OF LABOR

APPENDIXES I to XV



REPORT OF
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
UNITED STATES HOUSING CORPORATION

APPENDIX I.

INSTRUCTIONS TO "SECOND INVESTIGATION" COMMITTEE FOR THE COLLECTION OF GENERAL INFORMATION ON SITES FOR INDUSTRIAL HOUSING DEVELOPMENTS.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, TOWN PLANNING DIVISION, MAY 20, 1918.

NOTE. Investigators are to report also in accordance with instructions to investigators for the collection of engineering information, and suggestions for investigators' report for use of Estimating Department in making final estimates. Investigators should familiarize themselves with the bureau's instructions to engineers, instructions to town planners, and standards for permanent industrial housing developments.

(1) DATA AS TO AVAILABILITY OF SITE.

(To be filled in by the Investigators of the Production Division¹ as far as is necessary for decision as to site and kind of housing and to be completed by the designers after site is chosen.)

(If there is more than one site, use separate schedule for each. If area reported upon is larger than is needed, indicate the portion preferred, making a separate report on that portion if necessary. Accompany schedule with report, giving further detail where necessary.)

A. LOCATION.

1. Area, gross available. acres.
Area physically suitable for lots and streets... .. acres.
Area not suitable for lots and streets... .. acres.
This is unsuitable because.....
2. Cost, gross, of available area (estimated)
(appraised) by Real Estate Division..... \$.....
Cost, per gross acre, of land needed for total of
... houses..... \$.....
Cost, per square foot, of area suitable for lots
and streets..... \$.....
3. Topography: Maps filed as checked below:
District at scale of 1 inch to 1 mile (U. S. G. S. sheet).
Better map of vicinity of site (if obtainable).
Best map of site and boundaries available.
Photographs of site.
To be followed, as soon as possible after site is chosen, by
topographic maps of site, scales 200' = 1" and 40' = 1",
as per bureau's Instructions to Surveyors.
4. Relation to surroundings (shown as far as possible on small-scale
map):
Relation to } city plan.
There is no }
There is (is no) city plan commission.
Relation to adjoining towns.....
Relation to transportation system, steam and electric.....
Relation to State and county highways.....
Provision for present or future through traffic across develop-
ment is (is not) necessary.
A street plan has (has not) been proposed for site.
The following (No.) streets on the site have been dedicated.
Relation to playgrounds and parks existing or projected.....
Relation to factory sites.....
Relation to water front.....

4. Relation to surroundings—Continued.

- Distance from center of site to nearest railroad station
post office, shops, churches, fire
house, high school, grade school,
movies, other amusements (locations of
these and of industrial and residential areas shown on map).
Accessible grade schools can accommodate additional
pupils.
Accessible high schools can accommodate additional
pupils.
New housing will probably require, in addition to these existing
facilities:
Type of adjoining development.....
Type of development to be expected in neighborhood.....
Usual size of lots.....
Local custom as to alleys.....
Preferred types of houses, number of rooms.
Local peculiarities of design.....
Customary building materials.....

5. Accessibility:

- Distance from on highway,
miles.
Condition of highway.....
Grades of highway.....
Present highway can (can not) be developed,
estimated cost..... \$.....
New highway is (is not) necessary, estimated
cost..... \$.....
Distance of center of property from trolley line on Street
or right of way, feet.
Fare to..... cents.
Trolley line can (can not) be run through property,
estimated cost..... \$.....
Financed by.....
Distance of center of tract from freight siding on
R. R. feet.
Capacity of siding.....
Freight siding can (can not) be carried to property,
at a cost of..... \$.....

B. PHYSICAL CONDITION OF SITE.

1. Grading: Site requires (does not require) extensive cut (fill).
Available material } is.....
Place of disposal }
There are (are not) steep slopes.....

¹ That is, the architectural, town planning and engineering divisions, as they were later designated.

2. Clearing: Present surface cover.....
3. Soil: Nature of top soil depth fertility

 Nature of subsoil
 Approximate depth to rock where soil is shallow.....
 Nature of rock.....
4. Water: Water table is feet below surface. It is
 indicated on plan where water will interfere with cellars.
 Natural surface drainage is to.....
 Soil is (is not) pervious.....
 If necessary, water table may be lowered by.....
 Character of } running water streams
 There are no }
5. Frost: Maximum depth in ground.....
6. Winds: Direction and characteristics as affected by topography
 and other local conditions:
 Cold winter winds.....
 Prevailing summer winds.....
 Hot weather night breeze or drift.....
7. Nuisances, occurrence and possibilities of abatement:
 Mosquitoes.....
 Smoke.....
 Objectionable views.....
8. Existing features worth preserving if possible:
 Trees, shrubs, and plants.....
 Ledges, streams, ponds, and other natural features
 Structures, to be utilized.....
 Good views.....



APPENDIX II.

SUGGESTIONS TO INVESTIGATORS FOR INFORMATION TO BE TRANSMITTED TO ESTIMATING DEPARTMENT FOR USE IN MAKING FINAL ESTIMATES.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, REQUIREMENTS DIVISION, ESTIMATING BRANCH (AS LATER ORGANIZED).

1. LOCATION.

(a) Give location of project with reference to nearest supply centers.

(b) Give distance to nearest railroad terminal, stating number of cars per day such terminal can normally handle.

(c) If terminal is any distance from job, report if there are any plans for extending spurs to job, and if so will same be ready for handling material for same.

(d) If necessary to dray material from terminal to job give a thorough report on road conditions, in both dry and wet weather. Also investigate as to teaming facilities. Whether it will be possible to hire sufficient teams in neighborhood to readily handle material, or if there is an apparent scarcity of such.

(e) Give population and character of nearest community centers.

2. MATERIAL SUPPLY.

(a) List all reputable supply houses in nearest community centers, giving your personal opinion as to their ability to furnish ordinary miscellaneous supplies on a project this size. As far as practicable give their normal stock capacity.

(b) Locate as near as possible the nearest local supply of sand and gravel or crushed stone, advising if same is near enough to dray or whether railroad transportation will be necessary. State maximum capacity in each instance.

(c) Get in touch with at least two reputable contractors in nearest community and get their personal opinion, as far as possible, in regard to the condition of the local material market. Also get opinion of some good business man who is in more or less close touch with local material supply along same lines. Not necessary to inquire for prices unless especially requested to do so.

(d) Get list of local subcontractors who in your opinion would be qualified to successfully handle work in their respective lines on a job of this size, as follows: Plumbing, heating, electric wiring and installation, painting, plastering, roofing, etc.

3. LABOR.

This is an important item and should be investigated thoroughly.

(a) Interview the local secretary of the building trades union and get his opinion of general conditions as far as supply and demand for labor is concerned. Also interview at least two general contractors, one subcontractor in each trade, and a business man in this connection.

(b) State definitely if there is an apparent shortage of construction labor in the District.

(c) Are building operations in district active to such a degree as to absorb all normal local labor in the various trades?

(d) Is nearest community such as to care for a large influx of construction labor without resort to a construction camp? An influx of 3,000 or 4,000?

(e) If deemed best to keep men in nearest town, what would be most satisfactory way of getting them to job? Does car system or railroad run within reasonable distance? If so, are such cars at present unduly crowded during rush hours on account of other nearby operations? If no such systems, would trucks be necessary or would work be within walking distance?

(f) Taking above conditions into consideration, would you deem it advisable for contractor to erect barracks on job and take care of own men?

(g) Is there any apparent labor unrest in district? As far as you can gather, is there any feeling in district against imported labor? Or are conditions in district such that outside labor could have any objections to going there?

(h) Is nearest community union or open shop?

(i) If union get from secretary of each trade the exact number of men registered in that trade.

(j) Get scale of wages in all trades as per labor schedule attached herewith.

(k) If community nonunion get above information as far as practicable.

(l) Has local labor been accustomed to working overtime or receiving bonus or premiums of any kind?

4. CONSTRUCTION.

(1) Make test borings to determine character of soil in excavation. Carry same to depth of 12 feet unless solid rock is sooner encountered, and report definitely character of various soils encountered.

(2) State general weather conditions that are likely to be encountered in the six months following this report. Would locality possibly be subjected to spells of prolonged rain or other weather unsuitable for working at certain periods during this period of six months. Would weather due to this time of year be excessively hot or cold, or would it be more or less temperate? General information only wanted in this connection.



APPENDIX III.

INSTRUCTIONS TO INVESTIGATORS FOR THE COLLECTION OF ENGINEERING INFORMATION ON SITES FOR INDUSTRIAL HOUSING DEVELOPMENTS.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, TOWN PLANNING DIVISION.

A. GENERAL CONSIDERATIONS AFFECTING THE SELECTION OF SITES.

INSTRUCTIONS FOR INVESTIGATORS.

1. *Drainage.*—It is important to notice that the site can be well drained to ample depths required for cellars. High, slightly rolling or gently sloping land at least 15 to 20 feet above an available outlet in the immediate vicinity is highly desirable and ideal.

2. *Low lands available.*—Low marshy land with no marked drainage lines is not to be entirely avoided, because it can probably be developed, but at considerable expense for grading or pumping the sewage and drainage, which expense must be added to the land and should be kept in mind for comparative purposes.

3. *Marked natural drainage.*—Gently sloping land, with well marked natural drainage lines traversing it, is desirable, as cost for natural drainage is lessened and desirable open spaces are increased.

4. *Broken land.*—Very broken land, with accordingly rugged topography, all requiring a great deal of heavy grading to render it habitable, is to be avoided for present purposes.

5. *Desirable sandy land.*—Sandy soils, with low ground water level and good outlet, are desirable, although expensive to fully develop. The disadvantage of expensive black soil importation offsets in part the naturally good drainage, dry cellars, and cheap storm water removal available.

6. *Undesirable sandy land.*—Sandy soils with high ground water level and poor outlet facilities are expensive for the construction of underground work.

7. *Clay soils.*—Close clay soils are not entirely desirable, as surface drainage will be largely increased, especially where steep slopes prevail. Stiff clay makes for expensive pavements imperatively needed and often cellar drainage must be especially provided.

8. *Gravels and sands.*—Gravel soil: Sandy gravel even containing some clay makes an excellent site, particularly when porous and combined with low ground water level. Such a site needs a minimum of street pavement or, at best, inexpensive pavement, and the drainage system will be much cheapened. Excavation is also less costly than in some other soils.

9. *Sites best for streets.*—The topography best suited for streets will furnish grades not less than 0.3 or 0.4 per cent and not greater than 4 per cent.

10. *Corporate limits.*—It is important to note whether proposed housing site is inside corporate limits of the municipality and, if it is not, to ascertain possibility and terms for connections with existing municipal public utilities.

B.—SEWERAGE.

1. *Connection to existing systems.*—The available outlet for the sewers must be fully investigated. If this is through an existing

sewer in a neighboring sewer system, ascertain if it is large enough, where it empties, and what, if anything, it imperils. Report type of sewer system, whether sanitary, combined, or storm water.

2. Note approximate drainage areas, direction of flow, and relative surface elevations, with particular reference to the necessity and approximate size of storm sewers and open ditches.

3. *Long outlet.*—If long outlet sewers are necessary for connection with neighboring sewers, ascertain the cost of same and how this may compare with other possible outlets.

4. *Legal status.*—Investigate if local sewers in adjacent systems can be legally used without payment. If proposed housing quarters are outside corporate limits, can connection be made with sewers in corporation?

5. *Special assessment laws.*—Always check general statements about the use of adjacent sewers by consultation with the city authorities, and particularly see the special assessment laws and ordinances by which such sewer districts were formed and such sewers paid for.

6. *Constructive questions.*—Ascertain soil conditions as to cost of construction on the proposed site. Will banks stand up alone? To what depth? Quicksand? Rock? Ground water, etc.?

7. *Local material.*—Are there local supplies of building material? Lumber? Cement? Sand? Gravel? Broken stone, etc.? Prices?

8. *Local contractors.*—Are there local contractors and builders? What equipment is available, such as trench machines, concrete mixers, grading outfits, steam shovels, teams, motor trucks? Find recent contract prices for sewers, paving, curbs, and sidewalks.

9. *Transportation.*—What are the railroad switch and transportation facilities for delivery of material?

10. *Local labor.*—Investigate local labor situation with reference to available carpenters and laborers.

C.—SEWAGE DISPOSAL.

DATA GOVERNING THE SELECTION OF OUTFALLS.

1. *Outfalls to be first considered.*—As the sewerage and drainage is in many ways affected by the ultimate method of sewage disposal, it is essential that investigators should obtain the data for the proper solution and approval of that problem.

2. *State control.*—In most States the State board of health has control of the sanitary standards to be observed, and in some cases they issue rules, directions, and in other cases have well-defined policies which it is important to know and follow.

3. *Detailed approval by State authorities.*—Where State boards of health or other authority control stream pollution, it is usual to find that the law provides that they have final approval of all plans and specifications. This should be kept in mind.

4. *Extension of existing facilities.*—In localities where sewerage facilities exist, extension of such facilities is presupposed, unless the State authority or good practice requires their revision or rejection.

5. *Local practice.*—In developments which are contiguous to municipalities or are parts of municipalities, the practice and method of such municipality should be followed if good, and followed and supplemented by good practice where desirable.

6. *Isolated developments.*—Where developments are not adjacent to settled territory of any description, standards must be outlined, future expansion taken into account, and especially complete information obtained.

7. *Stream pollution.*—In general, streams should not receive raw sewage from isolated developments unless the extreme low water flow of the stream exceeds about 5 cubic feet per second for each 1,000 of the probable future population.

8. *Provision for future tankage.*—In every case where possible, outlet sewers should be at such elevation that sewage treatment by tankage can be readily introduced in the future, if required.

9. *Outlets.*—In the case of all considerable streams into which the contents of sewers is discharged, good practice would suggest that submerged outlets conveying the normal flow should extend out into water of such depth that the sewage will be quickly diffused and not easily observable. Overflow at the shore line may provide for abnormal flow.

10. *Tidal outlets.*—In cases where outlet sewers empty in tidal estuaries, special studies are necessary to be assured that freedom from offensive conditions will be obtained. In some cases where elevation is lacking, it may be necessary to store the sewage temporarily during high tide and in other cases it may be desirable for other reasons to release the sewage from storage reservoirs on the falling tide only.

11. *Partial treatment.*—In cases where the low water flow of streams available for sewage is less than about 5 cubic feet per second for each 1,000 of ultimate future population served, treatment works should be planned for, and if population in the near future requires, such works should be introduced more or less completely as circumstances appear to render necessary.

12. *Complete treatment.*—In cases where the sewage must be emptied into a stream quite insufficient in flow to properly deal with the sewage, treatment works of a reasonably complete character must be introduced.

13. *Complete plant for extreme cases.*—No sewage or polluted storm water should be discharged into a stream used as a source of domestic water supply at any point which may possibly contaminate such water supply, except in the most extreme cases. When it is absolutely unavoidable to divert the sewage from a stream used as a source of water supply, treatment plants of the most complete and reliable character should be introduced. A site involving the above conditions is undesirable and should not be selected if it is possible to avoid it.

14. *Provision for future treatment.*—Where it is likely that while the present population may safely empty sewage into streams, the future population can not probably do so. Space and elevations should be left so as to provide for the possible future installation necessary.

15. *Treatment sites removed from population areas.*—Sewer outfalls liable to require treatment plants should not be located in or near thickly populated or residential property, if it is possible to avoid it.

16. *Long outfalls avoided.*—But, on the other hand, long outfall sewers are to be avoided if possible, where the liability to introduce treatment works is only a future possibility. Short outfalls to the nearest outlet may be selected but at such elevation that intercepting sewers to more distant outfalls can be introduced when found necessary.

D.—WATER SUPPLY.

1. *Extension of existing facilities.*—Available water supplies already developed should be examined in detail to ascertain that they will be satisfactory from the standpoint of (1) quality, (2) quantity, and (3) pressure.

2. *Waterworks information.*—Waterworks information should include:

- (a) Type and capacity of pumps.
- (b) Average daily supply.
- (c) Population served.
- (d) Pressure near point of extension.
- (e) Relative elevation of proposed site.
- (f) Size of main supply pipes to site.
- (g) Reservoir and standpipe elevations for storage.

3. *Cost of connecting mains.*—Where connecting mains outside of the site are not sufficient in size or are deficient in pressure, the cost of supplying these deficiencies should be approximately ascertained, if possible, and also inquiry should determine if that cost will be assumed by the municipality or water company.

4. *Water rates.*—Ascertain if water is sold in adjacent territory by meter or flat rates or in part both, what these rates are, and what policy the water company or department will have in the matter of housing development, particularly if proposed housing quarters are outside of corporate limits.

5. *Cost, how raised.*—Ascertain if the extension of water mains within the housing development site will be a direct charge or will be amortized in the rates.

6. *Pressure.*—Find out if pressure is efficient, if new and higher pressure can be generally installed, if a high service district is necessary, or if booster pumps or storage will be needed.

7. *Fire engines.*—Ascertain whether fire engines are used or if extra fire pressure is developed at pumping station for fire service.

8. *Poor supply, quality.*—Water supplies from surface supply unfiltered are to be looked upon with suspicion, and, generally, arrangements should be urged, if possible, for their filtration or, at least, sterilization.

9. *Contamination by new housing.*—Water supplies in adjacent developments should not be imperiled by the installation of the new housing developments in such manner that the sewage will reach their source.

10. *Special report.*—If entire new supplies must be developed, an experienced waterworks engineer should especially report on the possible source and the cost of construction and operation, and should show the resulting rates as well.

11. *Pressure determination.*—Determine the pressure at important points by gauging the fire hydrants. Secure, if possible, the latest fire underwriter's report on the local water supply.

E.—STREETS AND PAVEMENTS.

1. *Situation.*—Note location of proposed housing site with reference to street connections of the municipality. Is site on a main thoroughfare? Will extensive street work be required to connect the housing site with the business and factory sections?

2. *Soil and drainage.*—As a well-drained site or one with gravel soil may materially reduce the necessity for expensive improved pavements, those features should be specially observed.

3. *Grades.*—The best topography for street grades will run not less than 0.3 per cent or 0.4 per cent and not greater than 4 per cent. Note extent of grading required for streets and houses.

4. *Local practice.*—Observe local practice as to types of pavement, street and pavement widths, curb and gutters, and sidewalks, particularly where there are recently built industrial housing quarters or new real estate developments. Note whether alleys are used.

5. *Local materials and prices.*—For approximate or comparative estimates, note availability of local paving materials and prices; also recent contract prices for pavements, curbs, and walks.

F.—ELECTRIC LIGHT AND GAS.

A good description of the local electric light plant and gas company should be secured. Have they capacity? How connected up to site? Cost? By whom paid? Report on local methods of street lighting.

Investigate rates. Is there dissatisfaction in community? Is it reasonable or unreasonable? Hear both sides to any con-

troversy. Compare rates with other similar situations. See if there is any reason for abnormal rates. Are rates governed by State or other utility commission?

Is service good? Quality of gas? How determined? What ordinance requirements? Electric light: Are there breakdowns and stoppages? Why?

Will companies finance complete installation and authorize through rates or expect cash cost advance and rates accordingly?

What contractual relations otherwise may be reasonably expected?



APPENDIX IV.

GENERAL INSTRUCTIONS TO COMMITTEE OF DESIGNERS.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, TOWN PLANNING, ENGINEERING, AND ARCHITECTURAL DIVISIONS, MAY 24, 1918.

THE WORK OF THE BUREAU.

It is the function of the Bureau of Industrial Housing to facilitate the provision of proper and comfortable housing and environment for workers in industrial plants in so far as this is essential to avoid delay in the prosecution of the present war.

The provisions made for the workers must be such as are suited to the life of a healthy, efficient, contented, and self-respecting community, but in each case this result must be obtained at a minimum cost, so that conditions causing delay may be relieved in as many communities as possible with the limited funds which can properly be allotted to this purpose. Therefore no improvements of any kind should be undertaken which local experience shows to be unnecessary for satisfying the population to be housed in each case, except that insanitary or other conditions seriously adverse to the physical or mental efficiency of the workers are not to be perpetuated merely because they are locally customary.

The good appearance of each development is a necessary and important consideration, but it should be obtained by an efficient and restrained design and arrangement of the houses, streets, open spaces, parks, and other features necessary for economic reasons, and not by any expenditure of funds purely for decorative purposes.

COMMITTEE OF DESIGNERS.

The designing of all improvements required for the completion of the housing developments undertaken by this bureau is to be done by a committee of designers, usually three, architect, town planner, and engineer, with such changes and additions as the bureau may subsequently authorize.

COOPERATION.

Since it is evident that there will be very many cases in which the functions of the designers overlap one another, and many plans in which will be embodied decisions made by more than one designer, it is essential that each designer keep himself informed of the progress of the other designers, and be free at all times to make to them any suggestions which occur to him, for the greater efficiency of the scheme as a whole.

CONSULTATION WITH BUREAU.

Each member of the committee is to consult freely and directly with the bureau at any time, especially with the chief of the section connected with his work, engineering, architecture, or town planning. The resources of the bureau will be put as fully as possible at the disposal of the designers.

CHAIRMAN.

One member of the committee will be appointed as chairman by the Manager of the Production Division of the Bureau of Housing. The chairman is to be responsible for coordinating the

work of the committee, and the other members will be subject to such instructions from him as are necessary, in his opinion, for the proper coordination of the work of the designers, and all instructions from the bureau to any one of the designers will be issued to each member through the chairman, or, if sent direct, copies will be furnished to the chairman.

REPORTS OF DISSENTING OPINION.

In respect to any work for which one member is professionally responsible, in case the instructions of the chairman require the member to adopt any decision which he believes to be inexpedient in view of all circumstances of the case, it shall be his duty, while proceeding in accordance with the instructions of the chairman, to submit a report of his dissenting opinion both to the chairman and to this bureau.

RESPONSIBILITY OF EACH DESIGNER.

The town planner shall be particularly responsible for the work lettered (T. P.) in the following description of the procedure of designers. The engineer shall be particularly responsible for the work lettered (E.). The architect shall be particularly responsible for the work lettered (A.).

NOTE.—This apportioning of the plans to be prepared among the designers is not intended to hamper the activity of any designer, but merely to fix responsibility for every part of the work, so that nothing may be overlooked. Any other subdivision of the field, which is satisfactory to all the designers in any particular case, will be considered by this bureau.

STANDARDS.

The designers will receive, from the Bureau of Housing, copies of the following standards and directions for procedure, for guidance in so far as standardization may be practicable and desirable in each individual case:

- General Instruction to Committee of Designers.
- Instructions to Investigators.
- Suggestions to Town Planners.
- Sample Town Planning Drawings.
- Instructions to Engineers.
- Standard Engineering Drawings.
- Instructions to Surveyors.
- Housing Standards.

(Standard house plans should be seen at the bureau and will be given on request.)

PROCEDURE OF DESIGNERS.

The choice of the site, and in a general way the number of persons to be housed and the amount of money to be expended in each particular project, will be determined by the Bureau of Industrial Housing and Transportation after a preliminary investi-

gation of the local housing problem as to the total amount and kind of housing needed, the availability of various sites, and the legal and financial relations.

After this has been done, the committee of designers, charged with the design of the particular project, shall report to the Bureau of Industrial Housing to receive instructions.

On the basis of these instructions, of the data furnished by the bureau, and of further data collected by the designers, they are first to determine tentatively on the general scheme of the project, covering all the important general aspects, but going into details no further than is necessary for this result. Where the particular case seems not to be met by the general instructions they are to consult the Housing Bureau and proceed according to its directions.

(T. P.) (E.) (A.) The designers shall at once begin the collection of information to complete the schedule of data as to availability of site and as to housing requirements in the bureau's instructions for the collection of data for housing design, as far as this shall be necessary.

(T. P.) or (E.) They shall have begun at once the preparation of two topographic maps of the property, "1" and "2." (See the bureau's "Instructions to Surveyors.")

The designers shall submit to the Housing Bureau in personal conference, as soon thereafter as possible, the following (three prints of each drawing):

(T. P.) or (E.) 1. 200-scale topographic map.
(T. P.) or (E.) 2. 40-scale topographic map (if ready at this time).

(T. P.) 3. A preliminary plan, at a scale of 200 feet to 1 inch, showing the location, width, and elevations at critical points of thoroughfares and minor streets, the location of public and quasi public buildings, the districting of the property according to use, the location of parks, playgrounds, and other public open spaces, available water supply, the drainage areas, the sanitary districts, and proposed outfalls.

(T. P.) Sketches for typical cross sections of the various streets (when finally completed, these will form plan "12").

(E.) 4. Data for the contractual relations of the Government with the municipality as to the municipal water supply, sewerage, storm drainage, public lighting, and also with the local public utility companies whose services are desired.

(E.) A tentative general layout of the main lines of the sewer system and sewage disposal works, if any, storm drainage, water supply distribution, location of pumping stations and water tower, if any, gas, electricity, and telephone systems should be shown at the same scale. (When finally completed this will be shown on plans "13" and "14.")

(T. P.) If necessary, sketches at larger scale should be submitted showing the general size, shape, and arrangement of lots within the blocks, and the proposed general location of houses upon the lots. If any great difficulties as to lotting arise at special points on the plan, tentative sketches for the solution of these problems should be submitted.

(A.) 5. Sketches showing the general types of houses proposed to be used. (See the bureau's "Housing Standards.")

(T. P.)

6. A tabulated report, stating:

(a) Total area of land.....	
Total area physically suitable for lots and streets.....	
Total area not physically suitable for lots and streets.....	
Total area planned to be in residential lots.....	
Total area planned to be in lots for other buildings.....	
Total area in parks and public grounds on land suitable for lots and streets.....	
Total area in parks and public grounds on land not suitable for lots and streets.....	
Total area in streets.....	
Total length of streets.....	
(b) Estimated number of workers per family.....	
Total number of families housed....	
Number of families in single houses..	
Number of families in semidetached houses.....	
Number of families in row houses..	
Number of single persons housed otherwise than in family dwellings	

7. Preliminary estimate of total cost of the housing project (including the following items, unless provided without expense to the Government). The figures submitted shall be based upon approximate quantities of the various classes and items of work, at estimated unit costs, and shall be classified as below stated and accompanied by detailed estimates where further detail is possible at this stage of the design.

These costs are to be estimated for the several items completely installed ready for use. Where the original cost of installing any of the utilities is not to be borne by the project, a memorandum of the proposed contractual relations with the municipality or the concern providing such utility, together with agreement or such rates as it is thought may be obtained, is to accompany whatever estimate can be made of the cost of its installation.

(T. P.)	(a) Cost of all the land acquired....	
(T. P.)	(b) Cost of clearing the ground.....	
(T. P.)	(c) Cost of all grading of streets, lots, and public grounds, including topsoil put in place..	
(E.)	(d) Cost of roadways.....	
(E.)	(e) Cost of curbs.....	
(E.)	(f) Cost of gutters.....	
(E.)	(g) Cost of sidewalks and walks, both on lots and public grounds.....	
(E.)	(h) Cost of storm drains and inlets..	
(E.)	(i) Cost of sewers and sewage disposal, including house branches to within 5 feet of house walls.....	
(E.)	(j) Cost of water supply, including services to within 5 feet of house walls.....	
(E.)	(k) Cost of gas supply, including services to house meter.....	
(E.)	(l) Cost of street lighting.....	
(E.)	(m) Cost of electric light for houses to and including house meter..	
(E.)	(n) Cost of telephone.....	

(T. P.)	(o) Cost of planting streets, lots, and public grounds, including plants, planting, and soil preparation	(E.)
(E.), (T. P.), (A.)	(p) Cost of professional service, engineer, town planner, and architect	(E.)
(A.)	(q) Cost of dwelling houses—	(E.)
	(a) Single houses.....	
	(b) Semidetached houses.....	
	(c) Row houses.....	
(A.)	(r) Cost of all other architectural structures pertaining to dwellings; e. g., sheds, fences, clothes reels, etc.....	(A.)
(A.)	(s) Cost of all other buildings.....	
(E.), (T. P.), (A.)	(t) Cost of all other things necessary for the completion and operation of the development.....	
(T. P.)	(u) From the above figures should be calculated the cost per family housed, and per worker housed, ¹ for the whole project, including all expenses which must be met to make it fit for its purpose.	(T. P.)

These results will be discussed by the Housing Bureau and the designers, and such modifications of the general scheme as seem desirable to the Housing Bureau will be determined upon and recorded.

On the basis of the preliminary scheme so revised, the designers will then prepare and submit to the Housing Bureau in personal conference as soon as possible the following (three prints of each drawing):

- (T. P.) 8. General plan, embodying all revisions of "3" to date, showing the general scheme in more detail, especially the shape of the blocks and lots, the location of the buildings, and the treatment of the public areas.
- (T. P.) 9. A pencil draft of the final grading plan, scale 40 feet=1 inch. This plan should show the grading of the streets, with 1-foot contours given at least at their intersections with the center line of the street and with the property lines. (See sample grading plan.)
- (E.) (T. P.) 10. Typical details and cross sections to accompany the grading plans for purpose of central bureau study.
- (T. P.) 11. Profiles on the center lines of the streets to accompany the grading plans; scale, horizontal, 100 feet=1 inch (or 40 feet=1 inch if necessary); vertical, 4 feet=1 inch. (See sample profiles.)
- (T. P.) 12. Typical cross sections of streets, showing in detail widths and relation of roadway, planting strips and sidewalks, location of trees, lights, hydrants, signs, etc.; scale one-fourth inch=1 foot.
- (E.) 13. Utilities plan at a scale of 40 feet to 1 inch, showing in detail the main lines and appurtenances of the sewers and storm drainage, water supply, and fire protection.
- (E.) 14. Similar plan showing gas, electricity, and telephone systems. On 13 and 14 the house connections, etc., may be shown typically, in enough

instances only to explain the procedure proposed in each case.

15. Profiles of sewers, scale horizontal 100 feet=1 inch, vertical 4 feet=1 inch. (See sample drawing.)

16. Profiles of storm drains, scale horizontal 100 feet=1 inch, vertical 4 feet=1 inch.

17. Special sets of sheets of standard size and convenient scale showing details of sewage disposal plants, if any, water works, if any, bridges, docks, and such other engineering works as may be locally necessary.

18. Architect's scale drawings and full-size details. (All floor plans shall indicate areas in square feet and volume in cubic feet of each house, together with area in square feet of each room.)

19. SPECIFICATIONS.

(a) *Town planning*.—Specifications for boundary survey and contoured topographic maps (where any special directions are necessary to supplement the bureau's standards), marking of boundaries and lot lines, etc. Specifications for clearing the ground, general grading, treatment of ground surface, preparation of ground for planting, plants and planting, decorative street details, etc.

(b) *Engineering*.—Specifications for roadways, curbs, gutters, sidewalks and other walks, storm drains and inlets, sewers and sewage disposal, water supply and fire protection, gas supply, street lighting, outside wiring for house lighting, and special engineering works locally necessary.

(c) *Architectural*.—Specifications for all dwellings, public buildings, or other buildings to be financed by the project. Specifications for all other architectural structures on lots, streets, or public grounds, etc.

20. Bills of materials. (a) Engineering and town planning, and (b) Architectural.

21. Necessary details. (a) Engineering, (b) town planning, and (c) architectural.

22. Such other plans and data as are necessary to enable the bureau to consider completely and pass upon the scheme as a whole. (a) Engineering, (b) town planning, and (c) architectural.

23. Detailed estimate of cost. (This will be a revision of "7").

24. Lotting plan for legal description of property in separate parcels. Scale 40 feet=1 inch. (This may be prepared during the progress of the work.)

25. Planting plans.

26. Engineering record plans. (These must be prepared after completion of work.)

27. Detailed reports as to contractual relations concerning provision and management of utilities and their rates for service.

After discussion of these plans, specifications, estimates, and reports, and final determination by the bureau of such changes as seem to them necessary, the designers are to proceed to prepare the completed plans and specifications and statements of contractual relations, consulting with the Housing Bureau whenever desirable, but using their own discretion in details. No part of the construction is to be undertaken until the bureau has approved plans and specifications for the same and authorized the work.

¹ For number of workers per house, see data from preliminary investigation by this bureau.

APPENDIX V.

INSTRUCTIONS TO SURVEYORS FOR THE PREPARATION OF TOPOGRAPHICAL MAPS, SCALES 200 FEET TO AN INCH AND 40 FEET TO AN INCH.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, UNITED STATES HOUSING CORPORATION,
ENGINEERING AND TOWN PLANNING DIVISIONS.

1. PURPOSE OF THE MAPS.

The purpose of the first map ("Map 1"), at the scale of *200 feet to an inch*, is to aid the Housing Bureau and its designers in the preparation of a *tentative or preliminary* plan of the proposed project. It is to be particularly noted, however, that such a *tentative or preliminary plan* having been prepared, discussed, and accepted by the Housing Bureau, there will be needed a second more accurate and detailed topographical map ("Map 2") at the scale of *40 feet to an inch* upon the basis of which a more complete *general plan and working drawings* for the project will be prepared. It is important, therefore, in order that there be as little as possible loss of time and effort on the part of the surveyor, that the first topographical map, at the scale of 200 feet to an inch, be prepared with the other more detailed map at the scale of 40 feet to an inch in mind.

Where time permits, a single survey may be made, adequate for the large-scale map, and the small-scale map may be drafted from the same data, with the omission of such details as can not be shown at the smaller scale without confusion. Where it is important to complete a small-scale map for preliminary studies without waiting for the requisite amount of field work to complete the larger-scale map, the usual procedure will be to establish the principal reference points with precision and to fill in with a minimum of field work the principal topographic features.

To enable the designers to work effectively, it is important to show on these maps many objects which would receive little or no consideration in designing purely engineering works. One class of such objects of no value in themselves, such as old fence lines, old buildings, limits of cultivated land, dense masses of bushes or coppice, limits of marshy ground as indicated by the kind of vegetation, etc., are needed (a) to aid in identifying on the map one's position on the ground or to locate rapidly and approximately on the ground certain lines drawn on a print of the map. Another class of objects, such as good trees over 6 inches in diameter, ledges, etc., are needed both for the above reason (a), and also because (b) the objects may be worth preserving as features of the landscape, to which proposed improvements may have to be adjusted.

With the above conditions in mind, the following instructions are to be interpreted broadly and the surveyor is to use his own judgment as to methods in the field.

2. PERMANENT REFERENCE POINTS AND COORDINATES.

(a) Permanent reference points are to be established not less frequently than 500 feet apart and are to be marked by stout durable wooden stakes with their tops 1 inch above the surface, or by drill holes or V cuts on ledges, large boulders, etc. In so far as wooden stakes are used, they should be referenced to more permanent and conspicuous objects. Where it will not interfere with the present use of the land, an additional sawed stake is to be set at

each of these reference points so as to show 2 feet above the ground and marked for reference. (b) The exact location of each reference point in relation to a system of rectangular coordinates is to be indicated on the map.

3. DETERMINATION OF TOPOGRAPHY.

These permanent reference points having been established, the method of determining the topography within them is to be left to the surveyor. It is suggested, however, that for the purposes for which the maps are to be used, either the plane-table or stadia method is sufficiently accurate and saves a great deal of time. Topography a short distance outside the tract should be noted where it seems likely to influence the design.

4. BOUNDARIES.

a, Boundaries of property as indicated by existing landmarks and as called for by recorded deeds are both to be shown on the map. Wherever these boundaries do not agree, the surveyor is to stake and show on the map the boundary which he advises as correct. (b) One survey is to be accompanied by a written description of the boundary by courses and distances. The latter are not to be entered on the topographic map.

5. BOUNDARY ROADS AND INTERIOR FEATURES.

(a) Show by full lines the property lines and traveled ways of all existing roads, dedicated streets and private rights-of-way and the property lines and tracks of steam or street railroads bounding upon, leading to, or within the property. (b) Indicate all interior roads, drives, walks and traveled ways, curbs, gutters, lamp posts, electric wire poles, fire hydrants, manhole covers, catch basins, the location of ditches and culverts (including the minimum dimensions of culverts), the location and size of sewers, water and gas pipes if ascertainable; if not, state whether or not such exist in any such street or way, whether bounding upon, leading to, or within the property; (c) show by light broken lines all proposed public roads and private rights-of-way bordering on, leading to, or within the property; (d) indicate width of traveled ways, side-walks and planting strips, adding figures showing width in feet if established by public authorities; (e) indicate swamps, streams and other bodies of water; (f) indicate cultivated areas, cliffs, steep slopes, pits, quarries, ledges, large boulders, springs, fences, walls and the outlines of buildings; (g) indicate by sketchy free-hand lines the outlines of existing groves or groups of trees. Locate accurately all isolated trees over 6 inches in diameter of trunk.

6. ELEVATIONS.

Give figures of elevation to the nearest tenth of a foot: (a) At each of the above described reference points (b) of summits, of salient points on ledges and of bowl-shaped depressions and at

top and bottom of steep slopes; (c) of normal surface of water in swamps, streams and other bodies of water; (d) of covers of man holes, bottoms of sewers at manholes, and wherever else obtainable; of bottom at each end of every culvert in and adjacent to the tract; (e) along center line and gutter line of all roads bounding upon, leading to, and within the property, with sufficient frequency to indicate gradients or changes in gradients; (f) on top of retaining walls and dams, at intervals on rails of railroads, especially at grade crossings and at overhead or under-crossing bridges and over culverts; (g) on the ground at up-hill side of base of all surveyed trees.

7. CONTOURS.

The contour interval is usually to be 1, 2, or 5 feet, depending upon the slope and irregularity of the ground and the scale of the map. As a general rule, the interval should be such that contours will show on the map in plan not more than 1 inch apart and not less than one quarter of an inch apart. In no case, however, need contours be closer than 1 foot intervals. On very steep, high banks and the face of cliffs and irregular ledges, contours may be omitted. If the contours do not clearly show any well-marked forms of the ground, such as artificial banks or terraces, these should be indicated by additional signs.

8. DATUM.

The city, town, or Government datum is to be used when practicable. In case some arbitrary datum must be assumed, it should be so low that minus figures will not be needed. The datum is to be named on the map and connection with any other known datum recorded.

9. BENCH MARKS.

Suitable bench marks are to be selected and accurately recorded by the surveyor, but their description need not appear on the map. Note location, and elevation in feet and thousandths, of one permanent bench mark on the map.

10. ACCURACY.

Errors are not to exceed: (a) 1 in 10,000 for boundary surveys and permanent reference points; (b) 1 in 1,000 for structures and other sharply defined interior features; (c) 0.1 foot in elevation in 1 mile for bench marks and turning points.

11. DRAFTING.

(a) The standard size for sheets is 24 inches by 36 inches, over all. Where the entire survey can be plotted on one sheet, the size, over all, is to be one of the following: 36 by 48, 24 by 36, 18 by 24, 12 by 18, or 8 by 10½ inches.

(b) The width of profile sheets (when ordered) is to be 18 inches over all; their scales are to be, unless otherwise directed, 1 inch to 4 feet vertically and 1 inch to 100 feet horizontally. (See Bureau's Standard Form of Sewer Profile.) The location of each end of each profile is to be indicated on each profile sheet.

(c) The map submitted is to be a tracing drawn on the rough side of tracing cloth. All lines, including contours, figures and lettering are to be drawn with black ink. The contours are to be numbered on the map at frequent intervals, invariably on the up-hill side. All lines are to be strong enough, and all lettering and figures simple enough and large enough, to show well on sun prints, or when reduced by photolithography to one-third scale. No wash color is to be used. Every fifth contour is to be a heavier line. Where there are slight angles in a boundary line, indicate the turning point on the map by a dot in a small circle. Indicate water areas by water lining. Mark true and magnetic meridians by simple arrows near the margin of the map, with the variation of the compass in figures when known exactly. Coordinate lines, normally 500 feet apart, are to be indicated by crosses at their points of intersection only. Make the title small and simple, giving the owner's and surveyor's names, locality, and date of completion of survey, and place it, together with a graphical scale, close to the bottom of the map, omitting border lines, so that the map may be sun-printed in combination with a separate tracing of the design without interference of titles. (See Bureau's Standard Form of Map Title.)

12. GENERAL.

Three blue prints of the survey are to be sent as soon as the tracing is made to the Engineering Division or to the Town Planning Division, as directed, Bureau of Industrial Housing and Transportation, 613 G Street, NW., Washington, D. C.

The tracing is to be sent to same address when all the work is completed and when there is no more need for it in the field.

All prints and tracings are to be sent rolled upon a stout, round stick.

APPENDIX VI.

TENTATIVE INSTRUCTIONS TO ENGINEERING DESIGNERS FOR SEWERAGE, SEWAGE TREATMENT, DRAINAGE, GAS, ELECTRICITY, AND STREET IMPROVEMENTS OF INDUSTRIAL HOUSING DEVELOPMENTS.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, UNITED STATES HOUSING CORPORATION, ENGINEERING DIVISION.

INTRODUCTORY.

The following instructions to designers on public utility design and construction are not intended to limit proper initiative or unduly confine the scope of design in any local housing development, but are compiled for the purpose of outlining the general policies, methods and scope of treatment of the Central Bureau in such a broad and comprehensive way that time will not be lost either by the Project Engineering Designer or by the Central Engineering Division in working up plans for each project that are unacceptable. It has been the intention to outline rather broadly what seems to be best in recent practice, what will be likely to be approved in the way of permanent and semipermanent construction and the relative balance between construction cost and operating efficiency. The local designer will, it is hoped, catch the spirit as well as the letter of the instructions.

A.—SEWERAGE AND DRAINAGE.

CONSIDERATIONS GOVERNING THE SELECTION OF OUTFALLS.

1. *Outfalls to be first considered.*—As the design of sewerage and drainage works is in many ways affected by the ultimate method of sewage disposal, it is essential that designers should determine the proper solution and receive approval of the outlet problem first of all.

2. *State control.*—In most States the State boards of health have control of the pollution of streams and the sanitary standards to be observed, and in some cases they issue rules and directions, and in other cases have well-defined policies which it is important to know and to follow.

3. *Detailed approval by State authorities.*—Where State boards of health or other authorities control stream pollution, it is usual to find that the law provides that they have final approval of all plans and specifications. This should be kept in mind and such approval should be obtained at the proper time.

4. *Extension of existing facilities.*—In localities where sewerage facilities exist, extension of such facilities are presupposed, unless the State authority or good practice requires their revision, substitution, or rejection.

5. *Local practice.*—In housing developments which are contiguous to municipalities or are parts of municipalities the practice and method of such municipality should be followed, if good, and followed and supplemented by good practice where desirable and possible.

6. *Isolated developments.*—Where housing developments are not adjacent to settled territory of any description new standards of practice must be adopted, future expansion taken into account, and especially complete information obtained.

7. *Stream pollution.*—In a general way it may be said that streams should not receive raw or untreated sewage from housing develop-

ments unless the extreme low water flow of the stream exceeds about 5 cubic feet per second for each 1,000 of the probable future population. In many instances this standard will have to be raised and in a few cases it may possibly be lowered.

8. *Provision for future tankage.*—In every case where possible outlet sewers should be at such elevation that sewage treatment by tankage at least can be readily introduced in the future if required.

9. *Outlets.*—In the case of all considerable streams into which the content of sewers is discharged, good practice would suggest that submerged outlets conveying only the normal or dry weather flow of sewage should extend out into water of such depth that the discharge will be quickly diffused and diluted so as to be not easily observable. Overflows at the shore-line bulkhead may be provided for abnormal flow.

10. *Tidal outlets.*—In cases where outlet sewers empty in tidal estuaries studies are necessary to be assured that freedom from offensive conditions will be obtained. In some cases where outlet elevation is lacking it may be necessary to store the sewage temporarily during high tide, and in other cases in which elevation is not lacking it may be desirable for sanitary and other reasons to release the sewage from storage reservoirs on the falling tide only.

11. *Partial treatment.*—In cases where the low-water flow of streams available for sewage is less than about 5 cubic feet per second for each 1,000 of ultimate future population served, treatment works should be at least planned for and if the population in the near future obviously requires that nuisance be prevented such works should be early introduced in a more or less complete extent as circumstances appear to render necessary.

12. *Complete treatment.*—In cases where sewage must be emptied into a stream not used for water supply but quite insufficient in flow to properly deal with the sewage, treatment works must be introduced that will so modify the sewage that stream dilution will safely deal with the effluent.

13. *Complete plant for extreme cases.*—No sewage or polluted storm water should be discharged into a stream used lower down as a source of domestic water supply at any point where it is possible to contaminate such water supply. When it is impossible to divert sewage from a stream later used as a source of water supply, treatment plants of the most complete and reliable character must be introduced and such plants must be efficiently operated by competent chemists as well as most carefully designed and the water supply below must be filtered under similar control. A site involving the above conditions is undesirable and should not be selected if it is possible to locate elsewhere.

14. *Provision for future treatment.*—Where it can be foreseen that while the present population may safely empty sewage into a stream, the future population can not probably do so, space and elevation should be left for sewage treatment so as to provide for possible future installation.

15. *Treatment sites removed from population areas.*—Sewer outfalls liable to require treatment plants should not be located in or near thickly populated or residential property, if it is possible to avoid it.

16. *Long outfalls avoided.*—But, on the other hand, long outfall sewers are to be avoided if possible. Where the liability to introduce treatment works is only a future possibility, short outfalls to the nearest outlet may often be selected, but at such elevation that intercepting sewers, to more distant outfalls, can be later introduced when found necessary.

B.—CONSIDERATIONS AFFECTING THE SELECTION OF THE COMBINED OR SEPARATE SYSTEM.

(1) CONDITIONS FAVORING SEPARATE SYSTEM.

The separate system of sewers is indicated as most desirable when the following conditions obtain:

First. Where storm water does not require extensive underground removal or where it can be concentrated in a few shallow underground channels.

Second. Where drainage areas are short and steep, facilitating rapid flow of the water over street surfaces to the natural water courses.

Third. Where the sanitary sewage must be pumped and additional cost of pumping even of a small amount of storm water is great.

Fourth. Where the sanitary sewage must be purified and storm water in a combined system either purified or by-passed—either scheme requiring large purifications plant capacity or creating nuisance due to the overflow of objectionable refuse.

Fifth. Where the sewers are being built in advance of a city's development to encourage growth, the separate system often provides a maximum number of miles of sewer for a minimum of expenditure.

Sixth. The storm sewers if ever required may be gradually introduced later and rarely need to cover over about one half the area covered by a sanitary system. This consideration, however, is not always applicable to the present intensive and complete housing development schemes.

Seventh. A combined system of sewers must usually be relatively of larger capacity than a separate storm drain for the same area, because the storm drain may be overloaded at long intervals with slight inconvenience, whereas in a combined sewer any overflow is accompanied by a great nuisance and complaint owing to basement connections and consequent liability of flooding.

Eighth. In general, rather rough topography with marked natural drainage and open spaced residential settlement not likely in the future to become dense, together with the desirability of sewage treatment, indicates the separate system as the method most desirable.

(2) CONDITIONS FAVORING COMBINED SYSTEM.

The conditions that indicate that the combined system is the one most desirable are as follows:

First. Where it is evident that both storm water drains and sanitary sewers must be fully and completely installed throughout the entire length of the street in the district, it is obvious that the total cost will be far greater for the separate than for the combined system.

Second. Where no pumping or purification is required at present or is anticipated in the future.

Third. In general flat topography without natural drainage and with dense settlement or future liability to dense settlement, together with the lack of necessity of sewage treatment, indicates the combined system as the method which is desirable.

COMBINATION OF TWO SYSTEMS.

Fourth. The selection of system to be adopted should not follow hard and fast rules. Often in the same development it may be desirable to provide in one part the separate system, in another part the combined system, and still in another part a combination of the two methods. Occasionally a combined sewer may be introduced in a separate system to advantage with interception of its natural flow at some point before the outlet is reached. The economical and efficient method is only arrived at by outline design and cost comparisons of different projects.

COMBINED SYSTEMS AND TREATMENT PLANTS SOMETIMES WARRANTED.

Fifth. It does not always follow that where sewage treatment is involved the selection of the separate system is imperative. It is usually desirable but cases may arise where the combined system should be adopted, although sewage treatment in some form is necessary. This latter condition will be found ordinarily where (1) all streets must have storm water removal; (2) where very complete treatment is not necessary; (3) where high grade effluent from the treatment plants is not warranted; (4) where storm flows can be safely and properly by-passed into flooded streams; (5) and in general where cost of treatment works (considering operation as well) for a somewhat large normal flow are obviously less than the cost of duplicate sewers in full throughout the district drained.

C.—CONSIDERATIONS AFFECTING THE DESIGNS OF SEPARATE SEWERS.

1. *Exclusion of storm water.*—Separate sewers are intended usually to convey household and industrial wastes only. Where adopted for good reasons, good practice requires usually that they should not admit storm water at all. The rigid application of this rule is accomplished with great difficulty and it can only be accomplished where good operating control cooperates with the original designer. Under the best of conditions it must be frankly admitted that few outlets from sanitary systems are entirely free from some influence from rainstorms.

2. *Storm water in separate sewers.*—Separate sewers are sometimes desirable where ultimate purification of the sewage is not necessary. Under this condition, at times, they may be used in a limited way for some storm water but only under complete control and with great care as against possible basement flooding, and this practice presents great danger of future abuse in the average municipality and is seldom advisable.

3. *Future extensions.*—Plans for a separate sewer system should not only show the development within the district to be sewered but also the extension of the system into outlying territory and the future areas likely to require such extension should be outlined.

4. *Location.*—Under some conditions separate sewers may be desirably located in alleys if alleyways can exist in convenient number, arrangement, and direction, but this is not to be taken as always best. Circumstances in each case will have to be attentively studied in detail before decision is made.

5. *Existing methods considered.*—Where the housing development will have an extension of existing municipal facilities having the separate system as their basis, methods and standards already introduced should be attentively studied and if in accordance with good practice extended.

QUANTITY PROVIDED FOR.

6. *Quantity of sewage.*—The quantity of sewage to be provided for in separate sewers will vary with the density and habits of population, the waste of water, the ground water infiltration, and industrial uses. And while no hard and fast rule can be laid

down because of radical difference in different localities, it is illustrative to say that a maximum safe working unit suitable for most normal conditions should count on about two families of five persons each per 20 feet of street frontage using, say, 125 gallons of water per capita per day, with an addition of 50 per cent for daily fluctuation in flow and an additional allowance for ground water leakage of from 25 per cent to 75 per cent, depending upon subsoil conditions. Such a unit of design will cover all small local districts of, say, 40 acres and under with large enough sewers without providing sizes so large that the ordinary normal flow creates objectionable deposit. This rough rule is not to be taken as indicating actual permissible housing densities, however, and is to be used only as a safe upper limit for sewer design. It has nothing to do with the ordinary or normal flow of the sewers necessarily estimated for pumping or treatment.

7. *Factor of safety.*—Because the size of small sewers influences their cost only to a minor degree, it is good practice in separate sewers from, say, 8 to 15 inches inclusive diameters, to proportion them so that they will only run half full with the maximum estimated flow expected. This provides a factor of safety against present and future contingencies.

8. *Minimum diameters.*—Owing to the liability of stoppage accidents it is desirable not to introduce a less diameter for street sewers than 8 inches and for lateral house drains or connections not to use a diameter of less than 6 inches.

9. *Illustrative.*—Under ordinary conditions an 8-inch sewer with normal grade can be expected to convey the sewage of a populated street at least 1,500 to 2,000 feet in length before enlargement is necessary.

10. *Unit of design for larger sizes.*—Above the size of, say, 12 or 15 inches diameter and for more than 3 or 4 miles of streets it becomes desirable to gradually modify the maximum unit of design as cost becomes an increasing factor. Good practice based on known gaugings would indicate that normally large main, outlet, or intercepting sewers should be proportioned on a basis of about 300 to 350 gallons per capita and 25 persons per acre and increasing densities as such special studies of the future indicate are necessary.

11. *Large sewers kept to minimum size.*—It is not desirable to proportion large main, outlet, or intercepting sewers for the separate system to flow half full for maximum flow, for the reason that such sewers are costly and future relief or overflow sewers can usually be readily introduced if necessity arise.

12. *Formula.*—In designing sewer sizes for both separate and combined systems, it is suggested for the sake of uniformity that Kutters' formula be used with $N=0.013$ for the pipe sewers and 0.015 for masonry sewers.

GRADES.

13. *Grades.*—The grades of separate sewers should be such as to produce self-cleansing velocities because increasing cost of maintenance and flushing is the result of grades flattened below self-cleansing requirements.

14. *Effect of noncleansing velocity.*—In general it may be concluded that when the sewer is running half full (or full) mean velocities of 3 feet per second ordinarily require no flushing and but very little maintenance. When $2\frac{1}{2}$ feet mean velocities only can be obtained, some flushing is desirable, especially at the upper ends of branch sewers. Where a mean velocity of only 2 feet per second can be obtained, flushing is increased; and with mean velocities below 2 feet per second very considerable maintenance is compelled and flushing is required, not only at the upper ends of all branch sewers, but often on the mains as well.

15. *Effect of topography.*—In very flat topography it is often impossible to get grades that will produce 3 feet mean velocity for sewers running half full without excessive and costly cutting,

and somewhat less velocities are fully warranted under such circumstances.

16. *Pumping, when to be resorted to.*—Where exceedingly flat grades are unavoidable and high maintenance cost inevitable, the alternative of pumping should be carefully considered so as to restore the opportunity to use self-cleansing velocities. Often under such conditions it will be a case where treatment plants must be introduced and pumping for that purpose is also necessary. Pumping of sewage is of course a recourse to be usually avoided if it is possible to do so.

DEPTH.

17. *Where cellars are not adopted.*—In localities where the streets are in valley bottoms and cellars are not customary or will never probably be introduced, the depth of sewers may be only such as to protect them from injury and afford the necessary grade for the house connections. A minimum of $2\frac{1}{2}$ to $3\frac{1}{2}$ feet cover at summits under these conditions will be indicated as permissible.

18. *Depressed streets.*—In localities where the streets are in valley bottoms or can be kept well below the grade of the adjacent lots, minimum depths of sewer can be adopted also, so that either cellar fixtures can be drained or in case no cellars are adopted the house fixtures are well above the house drain at its upper end.

19. *For cellars, residential.*—In all normal residential districts where cellars are adopted and where the surface of the street is practically the same as the surface of the lots, an average of 7 to 8 feet depth for sanitary sewers should be maintained. On summits and certain governing points in the place where such depths would entail a large amount of deep sewer throughout the length of the mains these depths can be properly reduced to 6 or even 5 feet in extreme cases.

20. *Business streets.*—For business streets and streets likely to develop into business purposes where cellar storage is a valuable asset a depth of 10 to 12 feet should be adopted for sanitary sewers wherever possible.

21. *Subsoil drainage.*—It is one of the desirable functions of the separate sewer that as ordinarily constructed in wet subsoils it gradually reduces the ground water plane by leakage, and this keeps adjacent cellars dry without other especial provision. This is accomplished with the usual form of construction and workmanship. In some cases, however, it may be desirable to exclude this subsoil leakage by especially tight joints and especially good workmanship.

22. *Manholes, how spaced.*—Manholes of a standard type designed by the Housing Bureau or those customarily used in the locality will be located on sanitary sewers. For proper inspection and maintenance these should usually be spaced from 130 to 200 feet apart on smaller sewers up to 20 inches in diameter and not less than about 250 to 300 feet on larger mains of 24 to 30 inches and upward. Manholes should ordinarily be located over all sewer junctions at the intersecting of all crossing streets and at drops and bends in the sewers.

23. *House connections.*—House connections should be not less than 6 inches in diameter. Drain layers are accustomed to lay house connections at a grade of one-half inch to each 3-foot length of pipe or 1 foot in 72 feet and this grade should at least be provided for wherever possible.

24. *House connections, how laid.*—House connections will usually be included in the sewer plans and extended to a point (say 5 feet outside of the building) where the house plumbing can conveniently connect with them.

25. *Plumbing, ordinances followed.*—Wherever developments are extended from existing facilities or within the limits of existing municipalities, the plumbing ordinances of such municipalities should be followed and in addition such good practice as is now considered indispensable, if possible. In isolated communities

where new plumbing ordinances must be originated in the absence of other authority, the Housing Bureau will prepare standards.

26. *Location.*—The proper location for sanitary sewers of the separate system will be usually either in the center line of the street or in the center line of the alleyways as may be decided upon. Circumstances may point to the desirability of location in the parking strip at times, and under some conditions.

27. *Utility location, streets versus alleys.*—The question of the determination of the proper location of utilities in streets or alleys, is one in which a considerable number of debits and credits must be summed up before a balance can be struck and a proper decision made in each individual case. Some more important items to be considered are as follows: (1) Disruption of street and sidewalk pavement versus alley pavement. (2) Disruption of street and sidewalk pavement versus unpaved alleys and sidewalks. (3) Disruption of street and sidewalk pavement versus private right of way for utilities at back of lots. (4) Amount and convenience of maintenance and repair for services under sod versus under pavement. (5) Comparative length of service pipe in each case. (6) Extra depth of the local main sewer usually necessary for long house drains. (7) Unfavorable effect of long house drains upon cellar depth where sewers are cramped for depth. (8) Extra depth of entire length of main sewer often increased at governing points by long house drains. (9) Extra length of long house drains to be kept free from stoppage and deposit. (10) In combined sewers the general necessity of inlets around street corners and in middle of long blocks for street drainage. (11) In water mains some desirable location of hydrants for necessary convenience of fire department. (12) Loss of pressure in extra length of small water supply service pipe. (13) Deterioration in extra length of small water supply services. (14) Constructive and operative difficulties of putting too many utilities in narrow alleys.

In a general way it may be concluded from long experience with the above items that it is seldom if ever desirable to put water mains, combined sewers, storm drains or gas mains when used for street lighting in alleys, but at times sanitary sewers and electric pole lines may be properly put in alleyways with good results.

D.—CONSIDERATIONS AFFECTING THE DESIGN OF STORM WATER DRAINS.

1. *Storm drains, limited in amount.*—Where the separate system has been adopted, the length of storm water drains actually constructed should be limited to locations of obvious necessity including probably much of the areas first to be paved and certain points of obvious storm water concentration.

2. *Natural drainage will reduce amount of storm drains.*—In sites having rough or broken topography or well-marked drainage lines, storm drains actually constructed will obviously be further limited in length so far as possible.

3. *Proportion of storm drains.*—In flat topography without marked drainage the amount of storm drains should not under normal conditions much exceed one-third or at the most one-half the mileage of sanitary sewer or the advantage of the separate system will be largely nullified.

4. *Water carried over street surfaces.*—The distance which water can be carried over street surfaces to the nearest storm drain will vary with rainfall intensity and slope. But in general it may be noted that it is undesirable to have even exceptional storms flood the street beyond the curb line. Ordinary storms should be conveyed without unduly flooding gutters for any great length of time. Probably 1,000 to 1,500 feet of street represents the limits to which it is ordinarily desirable to carry water over the street surface to the nearest storm drain inlet.

5. *Steep streets.*—Where steep slopes prevail great quantities of water can not be carried safely over inexpensively paved streets

and it is desirable to consider the extension of the storm drain in such cases rather than the introduction of heavy pavement not otherwise necessary.

6. *Ultimate development of storm drains.*—The designer should have a clear conception and should show on his plans (say in dotted lines) the ultimate storm drain system as it will be finally completed for the future population and in full lines for the present needs on the development site, so that proper comparison can be instituted.

7. *Entire watershed always considered.*—In every case where drainage areas cover more than the development site the designer should show generally the topography of the entire drainage area within or without the developed district and should have in mind plans for its ultimate outside development so far as storm water drainage is concerned so as to show clearly the extent to which the immediate site is affected.

8. *Improvement of natural watercourses.*—Under certain conditions it will be doubtless desirable to use watercourses and drainage lines extensively and in some cases even to improve them so as to render them efficient and slightly.

9. *Factors governing designs.*—The sizes and capacities of storm drains will depend upon rainfall intensity, drainage area, its shape, the impervious surface, and topographical slopes. Obviously the first two of these conditions need careful study.

10. *Existing experience utilized.*—Where the development is in extension of existing facilities or close to large population centers that have of necessity studied this problem it is necessary to fully develop all existing knowledge and data on the problem for presentation with the plans.

11. *Isolated development especially studied.*—Where the development is in an isolated situation requiring new standards and confronting lack of prior local experience pains must be taken to accumulate all available data to solve the problem correctly.

12. *United States intensities compiled for basis.*—Now that there exists through the United States Weather Bureau good data over a considerable period for rainfall intensities in most localities, or adjacent to them, good practice requires that those be studied and presented in the form of time and intensity curves, from which a limiting storm envelope can be decided upon.

13. *Standard form rainfall intensities.*—In either case it is desirable that the designer should procure such studies as have been made in the vicinity of his development or compile independent studies of rainfall intensities and file same with the Housing Bureau with his plans, in accordance with standard form here presented.

14. *Formula for run-off.*—From such data the so-called Rational Formula should be used and the quantities reaching the storm water drains from the controlling storm computed and the size of the drain so deduced, future impervious conditions alone being considered ordinarily.

15. While no absolute rule should be laid down for the determination of the size of storm drain in all localities, it is desirable to point out that storm drains, unlike combined sewers, involve no immediate damage by flooding cellars, and the surplus water of excessive storms overflowing storm drain capacity is often carried harmlessly away over street surfaces or can await opportunity for outlet. Under these conditions storm drains may be safely proportioned for a less number of the excessive rainfalls than combined sewers should be proportioned for.

16. As illustrative of the difference in proportion it is often felt to be sufficient if storm drains carry away only the water of storms, occurring as often as once each year, while combined sewers in residential districts should at least carry away the water from all storms occurring less often than 5 or 6 years and in business districts than 10 and 12 years, and in many extreme cases all storms of any size.

17. *Location of storm drains.*—The location of storm drains should preferably be on the south side or west side of streets and one-third of the way out from the curb line to the center of the street where possible. At times the parkway may be used and under exceptional conditions the alleyways.

18. *Depth.*—The depth of storm drains should be such as always to afford reasonable cover of at least 2 or 2½ feet. Good slope should be afforded to the gutter inlets when the storm drain is running full and at the same time its depth in the case of large diameters should be studied so as to interfere as little as possible with water, gas, sewer, and other cross-connecting services from the house on its side of the street to the utility mains beyond. (See standard drawing No. 3.)

19. *Material.*—The material used for storm drains should be that commonly used in the vicinity and easily available, short-lived materials for underground work being considered undesirable in the present instance unless for exceptional reasons. In steep slopes or drops, under some conditions, special materials must be used to prevent undue erosion of inverts.

20. *Manholes.*—Manholes on small storm drains below 24 to 30 inches size, especially where flat slopes prevail, should be introduced as often as one in about 200 feet, for larger size storm drains one in about 300 to 350 feet length. (For manhole design see standard drawings Nos. 6 and 18.)

21. *Catch basins.*—Inlet catch basins should be introduced along the direct line of the storm drain where topography is flat and available fall for the drain small. (See standard drawing No. 7.) Ordinary direct-connected inlets are all that is desirable where good grades for the storm drain can be secured. Inlets in flat topography should not often be more than 300 to 400 feet apart and should occur at all curb corners or at an adjacent point so as to remove storm water promptly from the street surface. On exceedingly steep slopes a special form of inlet should be provided so that swift gutter currents can be diverted with certainty into the storm drain.

E.—CONSIDERATIONS AFFECTING THE DESIGN OF COMBINED SEWERS.

1. *Where desirable.*—Combined sewers are usually desirable where no outlet pollution problems are involved and where it is required to remove storm water from practically all of the street and roof surfaces of the development.

2. *Intensity duration study.*—The same studies and duration intensity data are required for combined sewers as have been indicated as necessary for storm drains.

3. *Computation.*—The sizes and grades for storm sewers should be computed in the same manner as for storm drains and sanitary sewers.

4. *Utilization of existing experience.*—In all cases where the development is contiguous to or within the limits of a municipality the data hitherto used for similar work should be obtained and plotted in the form of a plotted rainfall intensity duration diagram with a deduced enveloping curve. (See Form). Where the local practice appears to be based on long experience and sound reasoning, it should be followed.

5. *Plot of watershed.*—In all cases a plot of the drainage area showing its shape and amount whether within or without the development should be filed. (See Form.)

6. *The enveloping curve.*—In fixing upon a suggested enveloping curve on the duration intensity diagram, somewhat greater rainfall intensity should be provided for in the combined system than for storm drains in the separate system for reasons heretofore stated.

7. *Outlying districts to have less factor of safety than business districts.*—In outlying residential districts, or in developments having no cellars to be flooded and also where it is desirable for good reasons

to keep cost low, somewhat less rainfall duration intensity should be included within the enveloping curve of the diagram than would be the case where cellars, business districts, or great density of population will exist.

8. *Tentative rule, business district.*—It is not possible to give any absolute rules for widely different localities, but in general it may be said that in congested districts with business cellars, all storms except the most intense occurring at long intervals (say 12 to 15 years) should be included in the enveloping curve.

9. *Tentative rule, residence district.*—In residential districts where cellars are not so deep relatively to the sewer or usually so full of valuable storage, intense storms occurring only once in say from 4 to 6 years may properly be excluded.

10. *Depth, grade, and material.*—In the matters of depth, grade, and material the same consideration should apply that has heretofore been outlined for sanitary and storm sewers.

11. *Location.*—Combined sewers should preferably be located in the center of streets or under exceptional circumstances in alleyways as may be decided.

12. *Inlets and manholes.*—The same considerations affecting manholes, inlet catch basins, and steep slope inlets for storm drains will apply to combined sewers equally well.

F.—CONSIDERATIONS AFFECTING THE DESIGN OF SEWAGE-TREATMENT PLANTS.

1. *Object.*—The object of sewage treatment commonly is the abatement of nuisance or conditions bordering on nuisance. In exceptional cases the object is to aid other important agencies to protect a domestic water supply from dangerous contamination.

2. *Limits of sewage treatment.*—Where sewage treatment is introduced to abate or prevent nuisance it should proceed no further in the process of purification than is necessary to accomplish that purpose at all times and under all conditions.

3. *Amount of treatment required.*—An outline of the conditions which in general control the amount of treatment needed has been given heretofore under the head of outlet conditions. This outline should be reviewed here.

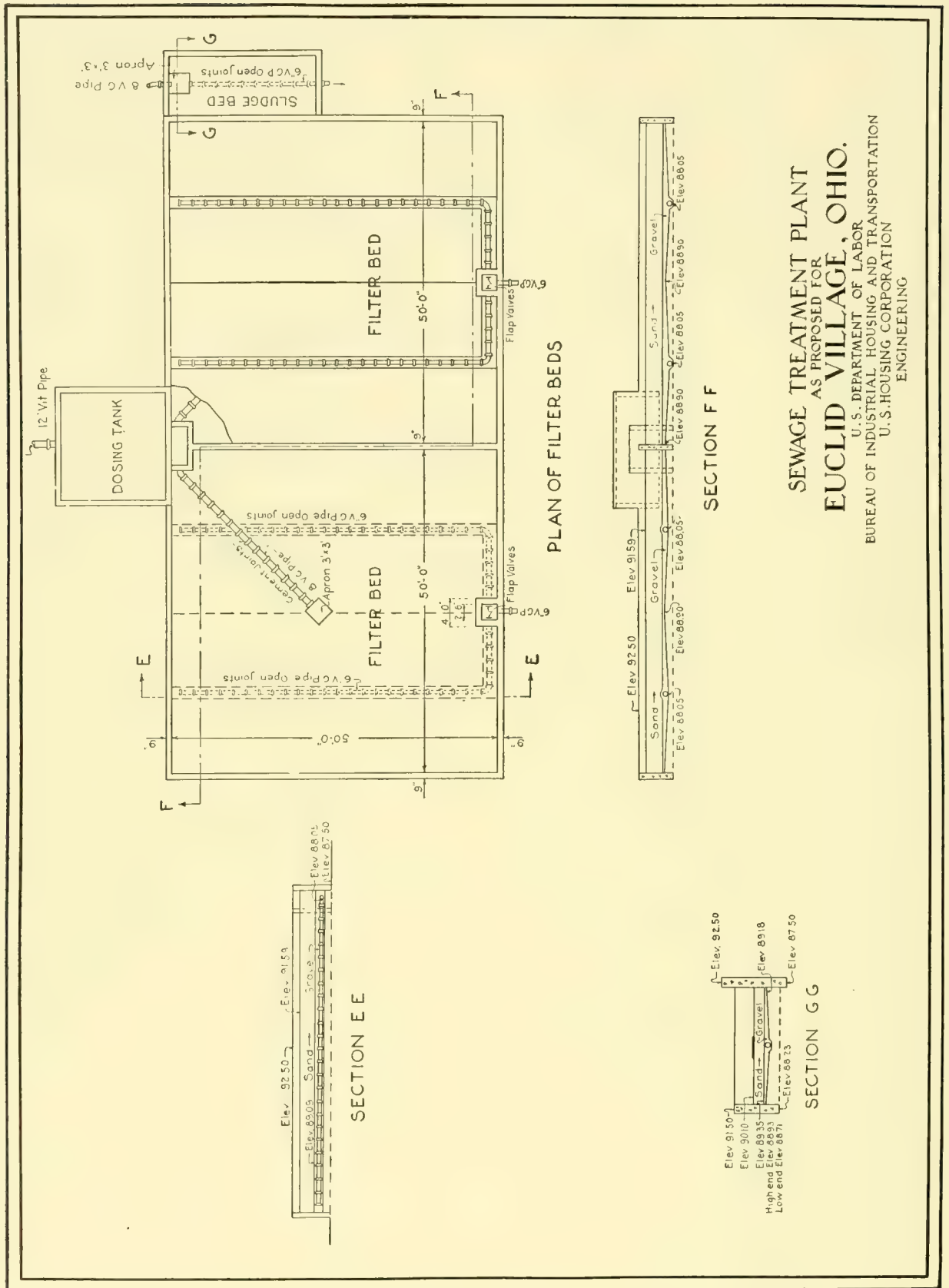
4. *Fresh sewage easily dealt with.*—The most successful sewage-treatment plants are those which receive fresh or comparatively fresh domestic sewage and which are especially designed to deal with fresh domestic sewage.

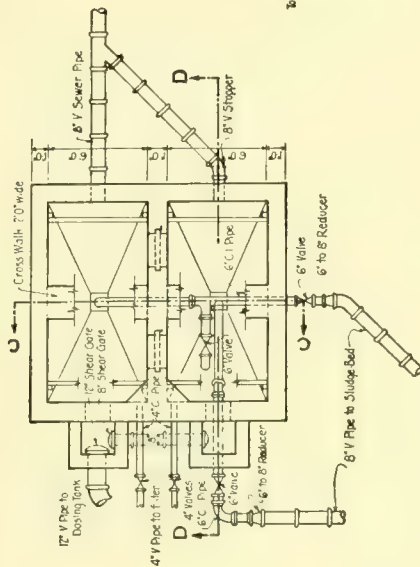
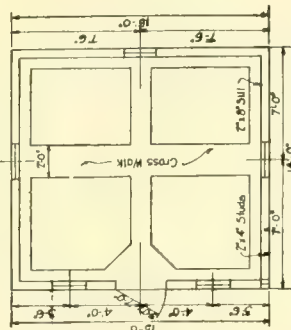
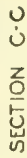
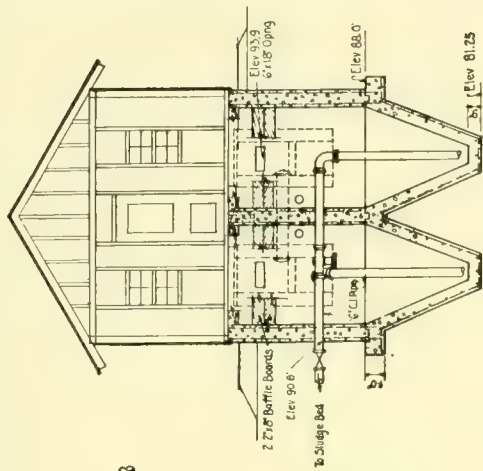
5. *Fresh sewage defined.*—Fresh domestic sewage may be defined for the present purpose as sewage from strictly residential areas which has not yet decomposed to such an extent that the contaminated liquid has lost all of its dissolved oxygen. Generally speaking sewage not more than four or six hours old, unmixed with other wastes will still retain this characteristic, but the liberal infusion of ground water leakage in transit will tend to prolong the condition.

6. *Stale sewage; difficulties of treatment.*—The treatment of old, stale or largely decomposed domestic sewage is an entirely different problem from dealing with fresh domestic sewage and requires a somewhat different design of plant. Old sewage may be defined generally as over 7 to 10 hours old and devoid of all dissolved oxygen.

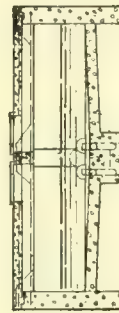
7. *Industrial wastes.*—The introduction of industrial wastes into domestic sewage before treatment and especially those wastes containing large amounts of acids complicates the problem and involves the designer in special studies and difficulties. Acid sewage for instance must be made alkaline before biological treatment can be successfully introduced.

8. *Location.*—For successful sewage treatment, sewage plants should be located as near the origin of domestic sewage as possible. As a practical consideration, however, the location of a sewage plant site near residential property is undesirable owing to many past failures of plants to do away with odor and public

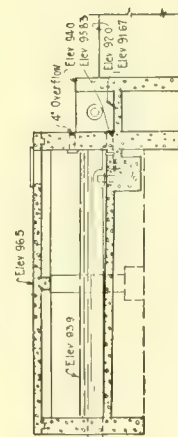




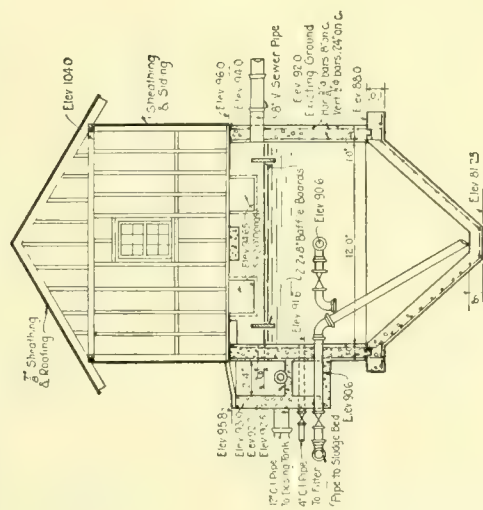
PLAN OF TANK



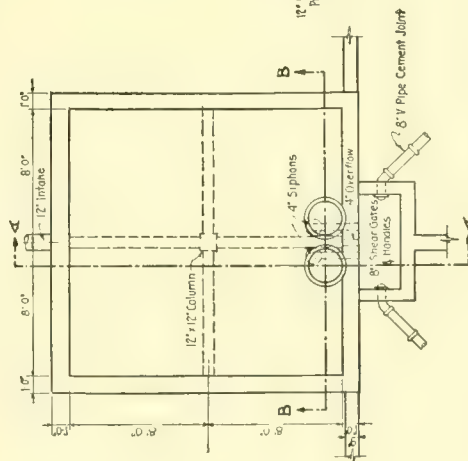
SECTION B-B



SECTION A-A



SECTION D-D



PLAN OF DOSING TANK

SEWAGE TREATMENT PLANT
AS PROPOSED FOR
EUCLID VILLAGE, OHIO.
U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING

prejudices arising therefrom. Probably a good compromise between these two limits is to locate the plant, if possible, so well outside of town sites that isolation is secured and yet sewage is not to exceed three or four hours old.

9. *Theory of design.*—Plants for fresh, or comparatively fresh, domestic sewage should be designed on the theory that the suspended solids should be promptly and effectively separated from the liquid and after division impounded in a separate chamber. It is further desirable that the liquid effluent after the separation from the solids should be passed on to further treatment still containing a considerable proportion of dissolved oxygen if possible.

10. *Conforming design to physical opportunities.*—To do this advantage may be taken of the physical fact that in all early stages of decomposing solids in sewage much entrained gas is generated which lightens the specific gravity of coarse suspended matters and tends to raise most of the mass to surface flotation on the separating chamber.

11. *Requisites of fresh sewage tank design.*—Good practice would therefore indicate in plants treating fresh domestic sewage that there should be provided: (1) A separation chamber or series of chambers with ample capacity for the formation of surface floating sludge; (2) sufficiently reduced velocities in such chambers to induce suspended matter to rise and be detained in the upper ones, or fall, if they will, into a hopper bottom; (3) inlet and outlet baffles to permit defused inflow and outflow at about mid depth; and (4) no longer period of detention for the liquid than is necessary for such complete and prompt separation of the solids as can be reasonably obtained.

12. *Sludge digestion annex tank.*—To such a chamber should be conveniently annexed a separate tank for the digestion and decomposition of the sludge. This digestion tank should carry its water surface at a lower head or level than that of the initial separating chamber so that the surface scum and sludge from the separating chamber may be easily drawn over into the digesting tank from time to time as it is available. The hopper bottom of the separating chamber should also be connected to the digestion tank by a pipe and valve so that the settled contents can be drawn over into the digesting tank at will.

13. *Additional separating chambers.*—If further detention of suspended matter is desirable a secondary separating chamber and even a third separating chamber can be introduced in all respects like the first one, the sludge content of such chamber being diverted by the plant operator from time to time into the common sludge digesting tank. Usually this should be done once in a week or so.

14. *Sludge beds.*—Means should be provided for withdrawing the contents of the sludge digesting chamber, after its complete digestion and reduction, which will occur in a period of some months. This can be done through the hopper bottom by pipe and valve to sludge drying beds prepared for the purpose.

15. *Effluent requirements.*—As has been already said, the effluent from the separating chamber should, if possible, still contain some dissolved oxygen or, where it can be readily done, it should be aerated to increase the dissolved oxygen that further filtration where necessary can be quickly and efficiently accomplished without undue odor.

16. *Old or stale sewage treatment.*—The initial treatment of domestic sewage of an age midway between fresh and stale can properly be carried on best in tanks as above described for the reason that ample provision is or should be made both for settlement and for flotation of suspended matter, but the treatment of domestic sewage and industrial waste of an advanced stage of decomposition is probably carried on as well in double story tanks of the Travis and Imhoff type because the entrained gases having largely escaped the specific gravity of the suspended matter is such that settlement occurs with but little flotation, hence such devices as the Travis or

Imhoff slot come into play well in separating suspended matter from the body of the sewage flow. In general more storage capacity must be provided for old decomposed and finely divided sewage solids than is necessary for fresh sewage.

17. *Retention period.*—No hard and fast rule can be laid down for the retention period in separating chambers in the design because the theoretical velocity across the chamber must always be a function of the specific gravity of the solids which in turn will vary with the age of the sewage which in turn will be different in different localities. In an illustrative way it may be said that for quite a fresh sewage a theoretical detention period of 30 to 50 minutes has been found effective in primary separating chambers and as much more in secondary chambers, and it is obvious that as the specific gravity of the solids approaches more closely to that of the liquid longer periods or more separating chambers are indicated.

18. *Flexibility through the unit system.*—Sewage tanks (and plants as well) must ordinarily deal with largely fluctuating conditions of flow both in quantity and quality. Moreover in a growing population not only is the quality often radically changing its character, but the quantity is constantly increasing. It is of the utmost importance therefore that all parts of the plant be designed on this unit basis with units out of service provided for the peak load or the future. This is not only necessary to properly take care of future growth, but also to enable the operator to throw in or throw out of service units as may be required to meet the constantly changing conditions of retention, concentration, age, and specific gravity. A plant (or its initial tanks) so provided with flexibility through the unit system avoids the danger of being improperly proportioned or of being beyond intelligent control in operation.

19. *Important details.*—Experience seems to show that rather deep (2 to 2½ feet width) separating chambers have some advantage over long shallow ones and it would appear that it is quite desirable that hopper bottoms have quite steep sides, 60 degrees from the horizontal being desirable, that is, where it can be obtained.

20. *Housing.*—Good practice now avoids the flooring over of tanks with permanent materials so as to embarrass inspection and operation. It appears on the contrary most desirable to provide for easy access and observation to all parts of the tank by walks and platforms, the whole tank to be preferably housed by inexpensive and convenient building, which will afford the operator protection, prevent trespass or accident, and, in cold climates, modify temperature conditions.

21. *Materials.*—Permanent materials appear to be indicated as desirable for all sewage tanks, except those whose situation is such that it is obvious that in the near future radical changes in outlet or location or method will have to be made.

22. *Water supply.*—The introduction of clean water hose streams under pressure from the nearest public water supply is highly desirable. Such supply is useful for occasionally cleansing fouled surfaces. Flushing and stirring dense mixtures are other aids to proper operation.

23. *Grit chambers.*—Grit chambers may be needed in many instances, particularly in sandy subsoils where sewer leakage occurs or in treating the flow of combined sewers or partially combined sewers receiving street washings.

SECONDARY TREATMENT.

1. *Further requirements after tankage.*—The question as to secondary treatment of tank effluent will largely be a matter of local study. If ample stream flow is available it is undesirable ordinarily to further treat the tank effluent. In some situations it may be desirable to chlorinate the tank effluent; in other cases long outlets into deep water with wide diffusion are desirable and in other cases further artificial treatment is necessary.

2. *Reason for filtration.*—Where further treatment is required it is usually because available stream flow is insufficient or because

of the necessity of aiding by sewage treatment the protection of domestic water supplies in the vicinity of the outfall.

3. *Stream ratio.*—Where stream flow falls below about 5 cubic feet per second per 1,000 of population, tankage is usually necessary, and if the stream flow falls below the amount necessary to neutralize tank effluent then further artificial filtration is indicated.

4. *Stream flow ratio, exceptions.*—The ratio of 5 cubic feet per second per 1,000 population must not be taken too literally, because it is modified by the character of the stream and temperature. In small brooks, and especially objectionable places with fresh sewage, there may be found several times 5 cubic feet and still satisfactory conditions may not be produced. In larger but more shallow creeks 5 cubic feet may not be enough and 7 or even 10 cubic feet per second may be required; while in larger rivers and unobjectionable places the ratios may descend to 4 and even in some extreme cases $3\frac{1}{2}$ cubic feet per 1,000 population.

5. *Effects of tank treatment.*—It is not possible to say with definiteness just what effect tank treatment may have in all cases, but it may perhaps be usually assumed in a general way that with well designed tanks properly operated about one-half the stream flow necessary for raw sewage will neutralize the tank effluent.

6. *Local conditions govern selection.*—In deciding upon further treatment to supplement tankage the available opportunities and materials of the locality in which the plant is situated will ordinarily play a very large part in the final decision as to the method adopted.

7. *Conditions pointing to trickling filters.*—In locations where fall is available and broken stone abundant and cheap and where some odor at times is unobjectionable the sprinkling filter or the contact bed may be used economically.

8. *Ordinary intermittent filtration.*—Where sandy soil prevails and land is not especially valuable some form of intermittent filtration on prepared areas may be well adopted.

9. *Intensive intermittent filtration.*—Where sand is available, land expensive, and particularly in small installations (below say a quarter or a half million gallon daily flow), well designed fully underdrained and properly graded and built artificial filters operated intermittently are an especially desirable and satisfactory

form for yielding a high grade effluent. It is to be doubted if, for small installations where conditions are favorable, any form of secondary filtration approaches this type in reliability under ordinary care.

10. *Minimum rates of flow.*—Rates of flow for filtration beds are commonly understood and well discussed in sewage disposal textbooks, but it should be pointed out that in plants dealing with fresh domestic sewage, where the effluent from correctly designed and well-operated preliminary tanks is satisfactory, rates of filtration in any kind of following filter may be higher than where old, stale and decomposed sewage must be dealt with. In the latter case not only should liberal areas be allowed for low rates of filtration, but as well rest and rejuvenation must be provided for up to very wide limits.

11. On the other hand (to illustrate) with fresh sewage rapidly put through the preliminary separating tanks, and with well designed artificially built up sand filters composed of ample underdrainage, graded gravel, and selected sands, experience has demonstrated that summer rates of flow can be very much higher than usually stated in the textbooks and can be maintained over long periods of time with only weekly raking and other minor attentions.

12. *Base of operation.*—In the design of sewage treatment plants it is of great importance to so design all of the principal operations that the superintendent can guide and control its functions without coming into offensive contact with the sewage or sludge. To this end simple mechanical means of operation are warranted in every stage of the case where diversion, flushing, sludge withdrawal or other similar operations are required. Plants so designed will be well operated where any unpleasant or disagreeable task is certain to be neglected.

13. *Designed for cleanliness.*—Plants should be so designed as to enable the operator to keep them clean and free from undue odor. This can be done where the unit proportions are correctly designed and operation is elastic, and where the sewage to be treated is not in an advanced stage of decomposition.

14. *Average rates.*—For general guidance of the designer the following table of suggested practice ordinarily applicable is presented:

Table showing tentative standards for sewage treatment.

	For fresh sewage 4 to 7 hours old, still containing dissolved oxygen.		For old or decomposed sewage, 6 to 25 hours old, devoid of dissolved oxygen.	
	Separate sewers.	Combined sewers.	Separate sewers.	Combined sewers.
Grit chambers.....	Velocity of flow, 8 inches to 2 inches per second.	Velocity of flow, 8 inches to 2 inches per second.	Velocity of flow, 8 inches to 2 inches per second.	Velocity of flow, 8 inches to 2 inches per second.
Separation and sedimentation compartments.	Capacity, 2 cubic feet per capita.	Capacity, 3 cubic feet per capita.	Capacity, 2.22 cubic feet per capita.	Capacity, 3.33 cubic feet per capita.
Sludge digestion compartments.	About 2 cubic feet per capita (small cities 5,000 and under).	About 2 cubic feet per capita (small cities 5,000 and under).	About 2 cubic feet per capita (small cities 5,000 and under).	About 2 cubic feet per capita (small cities 5,000 and under).
Sludge beds.....	0.1 square foot per capita	0.15 square foot per capita.	0.3 square foot per capita	0.4 square foot per capita.
Trickling filters for about 6 feet depth.	30,000 population per acre.	20,000 population per acre.	20,000 population per acre.	12,500 population per acre.
Contact beds for about 4 feet depth.	3,000 population per acre	2,500 population per acre	2,500 population per acre	2,000 population per acre.
Sand filters (natural conditions only artificially improved), depth about 3 feet.	1,800 population per acre	1,500 population per acre	1,200 population per acre	1,000 population per acre.
Sand filter (high grade selected sands and gravels fully built up along water works standard lines), depth about $3\frac{1}{2}$ feet.	2,500 population per acre	2,000 population per acre	2,000 population per acre	1,600 population per acre.

The above conclusions, tentative only. Local consideration may alter the above figures in any given case.

15. *Authorities to approve.*—Sewage treatment plants must be satisfactory in scope and plan to the sanitary authorities of the State and municipality where located, as well as to the Housing Bureau.

16. *Preliminary sketches submitted first.*—It is desirable that the designer here have preliminary conference with all those authorities with general sketches before proceeding to detail plans.

G.—CONSIDERATIONS GOVERNING THE INSTALLATION OF WATER SUPPLY.

1. *Water supplies usually on extension.*—It is to be expected that in most instances the water supply of the housing development installed under the direction of the Department of Labor will be made by an extension of existing water supply facilities, or will be so nearly adjacent to them that connecting mains will be economically possible.

2. *Cases where new supply is involved.*—Where housing developments are isolated from all other facilities or the extension of the existing supply is impracticable for good reasons, and also where the housing development is extensive enough to warrant the installation of independent water works, they must be considered.

3. *New works designed by experienced water works engineers.*—Where water supply developments involving the study and development of new sources of supply are found to be necessary, such problems should be intrusted to skilled water-works engineers.

4. *Cooperation and contractual relations.*—In the utilization of existing water supplies it is desirable and necessary to work in close cooperation through contractual relations with the local department authorities where the supply is municipally owned, or where privately owned, the owners or managers.

5. *Enlargement of existing plant.*—In some cases it will doubtless be necessary to arrange the enlargement, extension, or betterment of existing water works. In such cases investigation may be necessary so as to work intelligently and in close cooperation with the technical management or engineering advisors of the existing plant to bring about enlarged and satisfactory supply.

QUALITY.

6. *Quality of supply.*—Water supply introduced into any of the developments of this bureau must be at all times clear and free from sediment. Such supplies should not contain objectionable mineral constituents, and above all they must be entirely safe from a sanitary standpoint.

7. *Laboratory control where doubtful.*—To this end in cases of doubt or insufficient assurance the bureau may require that laboratory control and check shall be introduced where needed, so as to obtain the requisite safety and potability of the supply.

8. *Standards of purity.*—Standards of purity and safety shall generally be those introduced and maintained by the State authorities or the United States Public Health Service.

9. *Cooperation with State sanitary authorities.*—In all cases of doubtful quality of supply, the advice, control, and cooperation of the State authorities having charge over such matters should be sought.

10. *Filtered supplies.*—Where surface water supplies are unfiltered and unprotected, it will be desirable to urge that filtration of the supply be adopted and installed, unless conditions are exceptional.

11. *Supplies from Great Lakes.*—In supplies drawn from the Great Lakes and other large lakes, especial studies should be made to note the disposition of local sewage as affecting the purity of water supply.

12. *Rivers and streams.*—In supplies drawn from rivers and streams, unless strong evidence can be adduced as to continued purity and safety, sterilization or filtration or both will be urged.

13. *Impounded waters.*—Supplies impounded in large reservoirs or derived from inland lakes will be studied with care. At times

such water may be acceptable in natural state, but ordinarily they will be regarded as lying within a doubtful zone.

14. *Artesian and ground water development.*—The water from deep artesian wells and carefully developed ground water supplies will ordinarily be acceptable to the bureau in their natural state if mineral content is satisfactory.

15. *Typhoid rate.*—In deciding upon the purity and potability of water supplies in doubtful cases, it will be desirable to have studies of past health record and typhoid rates as evidence, not conclusive, but leading.

QUANTITY.

16. *Quantity required.*—In extending existing water supplies it is desirable before entering into contractual relations to be assured that the water plant already existing or to be enlarged can, in addition to the supply of the population already served, take on the additional population of the housing development, so that the original population served shall be supplied with water up to the demand already established (if reasonable) and the additional population can be supplied at the rate of at least 100 gallons per capita with 25 per cent in addition for fluctuation.

17. *Fire service.*—In addition to this supply, fire protection capacity should be afforded at a rate of the square root of the population in thousands, the quotient being the rate in million gallons per day for fire service. For instance, if the population is 9,000, allow water at the rate of 3,000,000 gallons per day for fire service as a minimum in addition to 1,125,000 gallons domestic consumption.

18. *Check on capacity and spare machinery.*—The designing engineer should assure the central bureau by careful investigation that the requisite storage or available supply is on hand or can be produced for the above rates of delivery, and in pumping supplies that the pumping machinery is in convenient units and that spare machinery is in sufficient amount, and in all cases that the distribution mains leading to or through the proposed housing development are existent or will be designed and laid so as to be of ample capacity in view of all the conditions effecting their delivery of water.

19. *Rule for water-pipe sizes.*—While no absolute rule should be laid for distribution pipe design in all cases, it will be helpful to have the following data for ordinary use:

Table showing population that can be supplied by pipes of various sizes based on 100 gallons per capita per day with average amount of fire protection.

Diameter of one pipe line, inches.	Sectional area of pipe, square inches.	Flat slopes and long lines, V=2 feet.	Average conditions, V=3 feet.	Steep slopes and short lines, V=4 feet.
4	13	12	27	48
6	28	61	132	228
8	50	182	302	666
10	79	425	900	1,500
12	113	835	1,720	2,850
16	201	2,320	4,620	7,400
20	314	4,040	9,520	14,900
24	452	8,900	16,700	25,500

20. *Exceptions to tables.*—This table may only be used as a very general guide, with high per capita consumption and under bad fire conditions the sizes should be increased. Under opposite conditions they may be reduced.

PRESSURE.

21. *Pressure standards.*—Where extension of existing water supplies is necessary, it is desirable to have some reasonable standard of pressure as well as of quantity. While the housing developments are largely residential, high business or other public build-

ings may occur and proper fire protection should therefore be provided capable of being increased as future growth demands.

22. In general, it may be said that 40 pounds per square inch is the least minimum desirable domestic fire pressure that ought usually to be provided; 50 or 60 pounds should be adopted where possible, and in special locations even higher domestic pressures are desirable.

23. *Fire pressure.*—Where domestic pressures are so fixed, pressures for fire protection should be temporarily raised to at least 60 to 70 pounds and 80 to 100 pounds is about the minimum desirable for business districts.

In some cases it is desirable to have the domestic pressure the same as the fire pressure, and in territory of variable elevations these figures should, of course, apply to the greater part of the higher lands in the development.

24. *Fire service.*—Ample pumping machinery for the maintenance of good fire pressure should be provided in duplicate.

25. *Fire reserve—tanks—reservoirs.*—Fire pressure may be maintained by reservoir reserve, by elevated tank or by elevated reservoir as in each case it may be found best.

Where satisfactory arrangements can be made with existing utilities to bring water to the site of the development, the local designer is charged with the duty of arranging that the distribution system and its accessories are designed satisfactorily to the Housing Bureau as well as to the operating utility.

CONDITIONS AFFECTING THE DESIGN OF DISTRIBUTION SYSTEMS. MATERIAL.

1. *Material.*—Pipe distribution systems for housing developments will, as a rule, be of permanent material and usually of cast iron. Steel pipe is to be avoided except under extreme and compelling conditions; other war requirements render it necessary to avoid its use where possible.

2. *Wood pipe.*—Wood stave pipe of high grade may at times be considered for long lines or for large sizes of pipe in exceptional cases, especially where time of delivery is not vital, and where cost must be kept down. On the Pacific coast, however, wood stave pipe may, under proper conditions, often have preference.

3. *Sizes.*—In ordinary cases the size of distribution pipe should range from 6 inches diameter upward; under certain circumstances 4-inch cast-iron pipe may be used for short lengths of main not requiring hydrants and especially where it is well connected at both ends to the larger pipe in the system. In very exceptional cases hydrants may be placed on short lengths of 4-inch main.

4. *Galvanized pipe.*—Street mains of galvanized iron pipe of 2 inches and upward to 3½ inches, inclusive, may be used in certain situations for district supply where hydrant service is not imperative, where population is sparse, or where, for exceptional reasons, cost must be kept down. Such conditions are, of course, rare in the present housing developments.

5. *House service.*—House service pipe from the street main to the buildings will usually be of galvanized iron unless local practice, peculiar water, or abnormal soil conditions would require lead services to be used.

6. *Local practice.*—Local requirement and practice and the experience of the local waterworks utility will, of course, have large weight in determining the selection of materials that will have a reasonable life under the local conditions.

7. *Weight.*—The weight, strength, and thickness of cast iron pipe and fittings should conform to the classification and weight determined in the Standard Specification of the American Water Works Association, unless local conditions should indicate that unusual practice is desirable.

LOCATION.

8. *Mains to be in streets.*—Water mains should usually be laid in the streets as fire hydrants for the fire department service of necessity are located there.

9. *Mains, where laid.*—The preferred location of mains in streets is on the east and north sides of the center and about two-thirds way out between curb and center line. Where local practice has fixed the location otherwise, however, it may be best to adopt it.

10. *Mains in alley-ways.*—Under some exceptional conditions water mains may be placed in alleyways, especially where hydrants are not required. On short runs and for small galvanized pipe systems, alleyway location may be preferable.

DEPTH.

11. *Depth.*—The depth to which pipe will be laid will depend on the severity of the climate and will range from 2½ feet cover in the south to 7½ feet cover in the northern climates likely to be encountered.

12. *Local experience.*—Local experience should be studied in each case by the designer to indicate the amount of depth necessary in each case to avoid injury by frost.

HYDRANTS.

13. *Hydrant spacing.*—Hydrants should be so spaced along the street length that the friction losses through fire hose are kept low; preferably not much more than 300 feet of hose is desirable. This result is often satisfactorily accomplished in well-settled districts by having a hydrant at each street corner and in the middle of long blocks.

14. *Fire requirements.*—Where the town plan is not of a uniform character, hydrants should be spaced so as to cover about 100,000 to 110,000 square feet of area.

15. *Fire underwriter advice.*—The reports and studies of the fire underwriters should be considered in determining the location and spacing of hydrants for any given fire hazard, particularly in congested or business districts, bearing in mind, however, that ideal conditions can not always be obtained.

16. *Hydrant observable.*—Hydrants should always be placed so as to be easily seen and readily accessible to the fire department.

17. *Valves, how placed.*—Valves should be liberally used in the distribution system up to a spacing where ordinarily two, and not usually more than three, blocks of pipe will be thrown out of service should occasion require a shut-off. Large mains up to 16 inches diameter should have valves from one-quarter to three-eighths of a mile apart. All pipe connecting to larger mains should be valved at the connecting corner and smaller pipe than 12 inches should be provided with a valve at least every quarter of a mile.

SERVICES.

18. *Service material.*—Services from the street main to the houses shall usually have a brass tap and gooseneck at the main and a brass corporation cock protected by a cast-iron stop box at the curb. Local practice will be a guide to these fixtures but will not always be controlling.

19. *Extension to houses.*—House service pipe will usually be extended to within 5 feet of basements of buildings in housing developments. Cooperation with house plumbing design must be observed.

20. *Stubs and services.*—Occasionally stub end service pipe or house services, for which there is no present use, will be laid to the curb. It will not be the policy of the Housing Bureau, however, to install such stub-end services extensively.

21. *Depth.*—House service pipe will generally be laid at the same depth as street mains unless local conditions or practice should require otherwise.

METERS.

22. *Policy.*—The general policy of the Housing Bureau will be to favor the introduction of house meters wherever possible.

23. *Requirements.*—The introduction of house meters, however, will depend chiefly upon the contractual relations with the local

public water utility and the Housing Bureau or the local regulations of the water utility.

24. *Flat rates.*—Where the local water department or water company have flat rates and do not use meters, the Housing Bureau will not insist upon them.

25. *Location.*—Where meters are installed they should usually be at the curb and should be installed in iron meter boxes of good pattern, and in cold climates should be specially protected.

26. *Cellars.*—Where local practice indicates that it is desirable to install meters in cellars, that practice may obtain.

CONSTRUCTIVE ORDER.

27. *Early installation.*—It is obvious that the water supply utility should be early installed in the progress of the housing development so that an ample supply of water for all building purposes can be assured and temporary supplies obviated where possible.

28. *Water supply first.*—To this end every local installation should arrange and plan to provide first for water supply if possible.

MEMORANDUM AS TO FIRE HYDRANTS.

To: Project Engineer.

Subject: Fire Hydrants.

The following information is required from you to enable our Purchasing Department in Washington to place order for fire hydrants.

Yours, truly,

JOHN W. ALVORD,
Chief Engineer.

.....

District Engineer.

Fill out following and return:

1. Diameter of Supply Pipe inches.
2. Diameter of Barrel inches.
3. Diameter of Inlet Valve inches.
4. Depth of cover inches. (From surface of walk to top of supply pipe.)
5. Total number of nozzles of all kinds (on each hydrant).
6. Fire suction (steamer) nozzles, number (on each hydrant).
7. Fire Suction Nozzles, Inside Diameter inches.
8. Fire Suction Nozzles, Diameter out to out on male threads inches.
9. Fire Suction Nozzles, Number of Threads per inch
10. Hose Connection Nozzles, Number (on each hydrant).
11. Hose Connection Nozzles, Inside Diameter inches.
12. Hose Connection Nozzles, Diameter out to out on male threads inches.
13. Hose Connection Nozzles, Number of Threads per inch
14. Is frost case required?
15. What is type and make of fire hydrant now in use?
16. Trade size of above?
17. Must this type be adhered to?
18. Is Valve on supply pipe from main needed?
19. If so, what is size?
20. State exact size and shape of nut or nuts for wrenches.
21. State direction of turn for opening? (Clockwise or counter clockwise.)
22. Remarks. (Give sketch of Hydrant if necessary.)

Place

Date

(Signed)
Project Engineer.

To J. W. ALVORD,
Chief Engineer.

MEMORANDUM AS TO WATER RATES.

District and Project Engineers:

GENTLEMEN: Your attention is called to the following memorandum in regard to water rates prepared by the Engineering Division of this office:

The essential principles involved in a water rate question are:

1. The gross income must be sufficient to provide for:

- A. Interest on investment.
- B. Replacement or depreciation.
- C. Operating expense:
 - (a) Administration.
 - (b) Running expenses.
 - (c) Current repairs.
 - (d) Insurance.
 - (e) Taxes.

2. Approximately the rate of return upon an investment in water works property may be taken as follows:

	Per cent.
Interest.....	5
Replacement.....	2
Operating expense.....	5
Total.....	12

3. The stated investment is usually made for a two-fold purpose and may be divided about as follows:

	Per cent.
For fire service.....	30-40
For domestic service.....	70-60

4. In framing a schedule of rates which will afford proper return upon an investment in water works property at the rates hereinbefore stated in (2), it must be remembered that the volume of water entering the pipe system at the source of supply is considerably greater than the volume registered by the domestic service meters (pay water) in about the following proportion:

	Per cent.
Pay water (meter registration).....	75
Unavoidable waste.....	25
At source of supply.....	100

Water rates should be predicated upon the "pay water" basis.

5. The gross income should be derived from two independent sources: (a) For fire service (30 to 40 per cent of income) from a general tax assessed against the taxable property of a city in proportion to its value; (b) for domestic service (70 to 60 per cent of income) from the individual consumer in accordance with an established schedule of charges. The rate schedule should be based upon a unit of volume of water consumed (which discourages waste) and never upon an annual payment per fixture in the house (which encourages waste).

Moreover in order to avoid a penurious use of water, the rate schedule should provide a monthly minimum charge for a specific volume of water used or not used.

6. The fire service rate may be taken at 9 to 10 cents per linear foot of cast-iron pipe, or 6 to 7 cents per linear foot of wood pipe at present prices of labor and material.

7. The consumer's rate may be based upon an average annual consumption of about 20,000 gallons per capita of "pay water" at a charge \$3.25 to \$3.75 per year per capita when cast-iron water pipe is used or a charge of \$2.30 to \$2.60 per capita when wood pipe is used. These figures are based upon average waterworks layout.

8. The foregoing charge per capita is based upon a uniform meter rate for all consumers, large or small. Where a sliding scale downward is desired in favor of the large consumer, the domestic rate for the individual householder should be increased proportionately. This can be accomplished by classifying or

grouping consumers and adapting a rate to each group which in the aggregate produces the desired income.

9. The minimum monthly rate is particularly applicable to the domestic consumer using a $\frac{3}{4}$ -inch service and under present-day cost of labor and material should range: For cast-iron pipe installations \$1.35 to \$1.60 per month; for wood-pipe installation \$1 to \$1.10 per month.

(Signed) JOHN W. ALVORD,
Chief Engineer.

H.—CONSIDERATIONS GOVERNING THE INSTALLATION OF GAS SUPPLY.

1. *New gas works.*—It is not to be expected that the Housing Bureau will in any case create a gas supply where none available exists.

2. *Extension, by contractual relations.*—The extension of existing facilities therefore is all that can be contemplated in any given case. This extension will be usually by such contractual relations with existing utility companies as will insure standard gas service throughout each development at reasonable rates.

3. *Adjustment rates.*—Where the rates for gas from existing utilities companies have been fixed by ordinance in the community or adjusted by the State utility commission such rates shall usually prevail.

4. *Cost of mains, by whom borne.*—In cases where full and proper rates are fixed by contractual relations, it is to be expected that the gas company will extend its pipes throughout the development under the general direction of the Housing Bureau and bear the cost thereof.

6. *Material.*—Distribution systems for gas should be of permanent and enduring material, particularly where laid under pavement.

7. *Location.*—The gas mains may be laid in the streets or in the alleyways, as may be decided in each individual case; where street lighting is by gas the mains should be laid in the streets, and they should be usually placed on the west and south sides of the streets about two-thirds of the way out between the curb and the center line. Occasionally they may be placed in the parkways if found desirable.

8. *Depth and grade.*—As gas mains have to be laid to grade in order to secure drainage, their location, depth, and grade should be carefully studied in each instance by means of street profiles, so as to prevent interference with other utilities.

9. *Services.*—Gas services to all houses will be usually installed to the meter inside of the cellar wall in building to be served. Services shall be of such material, depth, and location as is generally customary in the vicinity.

GAS APPLIANCE CONSUMPTION TABLE.

Appliance.	Gas consumption.	Candle power.
Home light.....	4 cubic feet per hour.....	80
Gem light.....	2½ cubic feet per hour.....	80
No. 20 Reflex.....	10 cubic feet per hour.....	300
No. 30 Humphrey.....	13 cubic feet per hour.....	400
No. 71 Upright.....	5 cubic feet per hour.....	70
<hr/>		
Gas ranges.		
Gas consumption		
Small burner.....	15 cubic feet per hour.	
Large burner.....	20 cubic feet per hour.	
Simmer burner.....	4 cubic feet per hour.	
Oven burners.....	40 cubic feet per hour.	

No. 425 Vulcan water heater, 60 cubic feet per hour, heats about 12 gallons water to 120° in 15 minutes.

INSTANTANEOUS WATER HEATERS.

The number of the heater indicates the gas consumption per minute, and the water flow in gallons, thus:

No. 2½, 2½ cubic feet per minute and 2½ gallons water per minute.

No. 3, 3 cubic feet per minute and 3 gallons water per minute.

No. 4, 4 cubic feet per minute and 4 gallons water per minute.

No. 6, 6 cubic feet per minute and 6 gallons water per minute.

SERVICE PIPE SPECIFICATIONS.

A $\frac{3}{4}$ -inch pipe will supply about 88 cubic feet per hour.

A 1-inch pipe will supply about 180 cubic feet per hour.

A 1½-inch pipe will supply about 310 cubic feet per hour.

A 1½-inch pipe will supply about 490 cubic feet per hour.

A 2-inch pipe will supply about 1,000 cubic feet per hour.

Service pipes should be 1¼ inches through and just inside of foundation wall of building ready for meter connections, laid so as to fall toward the street mains; where this is not possible, drip toward meter and provide a short piece of pipe at end with a tee connection looking down before entering the meter. Do not set any meter less than 5-light high-class B. For a 7 to 10 room house use no less than 1 inch riser pipe—same as for a gas range. Lay all street mains by a 2-foot spirit level falling to drip pot at some central point.

I.—CONSIDERATIONS GOVERNING THE INSTALLATION OF ELECTRIC CURRENT SUPPLY AND LIGHTING.

1. *Installed only where available.*—It is to be expected that usually the housing development will introduce electric light and current only when adjacent utilities are available and can extend their service into the district.

2. *Creating plant.*—It is possible in exceptional cases that plant for this purpose may have to be created. If so, experienced electrical and mechanical engineers should be engaged to design and construct them.

3. *Contractual relations.*—When existing utilities are available, some form of contractual relation must be entered into by which rates and service standards are defined.

4. *Overhead distribution.*—Under ordinary conditions overhead distribution is contemplated, preferably by pole lines installed as far as possible in alley-ways. See standard specifications for overhead distribution lines dated September 25, 1918. (P. 462.)

5. *Modifications.*—Under conditions where frequent street lighting is afforded by electric current, modification of this method may be necessary and desirable in some cases.

6. *Materials and construction.*—Standard of materials and construction will, as a rule, be similar to that adopted and defined in the existing ordinances in the community where they are installed.

I-1.—ELECTRIC STREET-LIGHTING SYSTEM.

SUPPLEMENTARY INSTRUCTIONS TO ENGINEERING DESIGNERS.

The following general considerations should govern the design of electric street-lighting systems, unless local practice or other special conditions indicate that some change or deviation will be desirable.

These considerations particularly apply to cases where the Housing Corporation will have to install or maintain the street-lighting system.

In cases where the utilities are to install and maintain the street lighting, they may safely be allowed to specify all details, provided they contemplate installing a system that will be adequate and that will meet our approval as to appearance.

(1) A combination of overhead and underground conductors as part of the same series circuit is undesirable. It renders the system liable to excessive lightning trouble with consequent interruption of service and will mean high cost of maintenance.

(2) Metal posts and underground conductor cables are excessively high in cost and it is almost impossible to get the latter. In general, it will be necessary to use wood posts with some form of fixture attached, the same to be fed by means of overhead wires because of availability and lower cost.

(3) It will probably be economy to use lighting fixtures that are designed to give the maximum illumination value and to space them reasonably far apart rather than to use cheaper fixtures with closer spacing. Fixtures that throw the greatest amount of light in a plane 15 degrees below the horizontal and with a minimum of upward or downward distribution should be specified.

(4) Wherever it is contemplated that the house-lighting lines will be placed at the rear of the houses in alleys or along the dividing property lines, it will usually be practical to place the street-lighting wires on the same poles, bringing them out to the street only at the points where lights are to be placed, the idea being to have few if any wires along the streets.

(5) Wherever the plan suggested above is not feasible, the following is offered as a suggestion for making overhead wiring as inconspicuous as possible and also to prevent the wires from coming in contact with trees. Lamp posts and other poles for supporting the street lighting wires may be located in the planting space slightly offset toward the street from the tree line. The wires may be attached to the poles by means of metal brackets with slight projection and be supported at a height that will allow them to pass underneath the lowest tree limbs. This will probably be about 16 feet above the ground level. When necessary to cross a street the wires can be supported high enough to give the required clearance.

(6) Lamp sizes and spacings within the following limits will give reasonably good street illumination:

Size.	Spacing.
Business districts:	<i>Feet.</i>
250 candle power.	100-200
400 candle power.	200-400
Residence districts:	
100 candle power.	100-300
250 candle power.	200-400

MEMORANDUM AS TO RATES FOR ELECTRIC SERVICE.

To all District and Project Engineers:

GENTLEMEN: Your attention is called to the following memorandum, prepared by the Engineering Division of this office:

In cases where it is intended that the Army, Navy, or war industry shall supply electricity to the tenants in adjacent housing projects, the question of rates must be settled. In most cases the cost of production is about 1 cent per kilowatt hour. To deliver electricity to and distribute it within the project will make the total cost about 3 cents per kilowatt hour. In making retail rates the following considerations should be borne in mind:

If current is supplied to the consumers by meter, it will involve:

1. Purchasing the meters.
2. Maintenance of the meters.
3. Reading the meters.
4. Billing and collecting.

The use of meters will insure the proper use of current, prevent waste, and is the most equitable method.

Current sold on a flat monthly charge will eliminate the purchase, maintenance, and reading of meters. If the flat rate for current is

included in the property rental, the billing and collecting will also be eliminated. The disadvantages of a flat rate are:

1. Unfairness—the large user paying no more than the small user.
2. Wasteful and improper use.
3. Expense of supervision and control to reduce waste and abuse to a minimum.

If a meter rate is adopted the price should not be less than 5 cents per kilowatt hour, and in most cases should be very close to the rates charged in nearby towns for obvious reasons.

If a flat rate is made, it should not be less than 50 cents per month for a room in a dormitory, and not less than \$1 per month for small houses, and proportionately more for larger houses. In some cases where flat rates are used it may be advisable to "bury" the lighting rate in the rental price of the room or house. In other words, determine the rental and also the lighting rate, add the two together, and state the sum as "rent including lighting."

(Signed) JOHN W. ALVORD,
Chief Engineer.

I-2.—CONSTRUCTION OF OVERHEAD ELECTRIC DISTRIBUTION LINES.

Scope.—The following standard specifications cover approved materials and methods of construction. They should be used as a guide when making up specifications for projects where the Housing Corporation will have to build the electric distribution lines.

Plans.—Plans should be prepared showing the location of primary, secondary, and street lighting circuits, poles, street lights, guys, transformers, substations, and other important features. The source of supply, either existing or to be built, should also be shown.

Details.—The plans and specifications should clearly explain construction details; for example, type of street-lighting fixtures, size of street lamp, location of poles relative to curbs or trees, kinds of poles, apparatus, etc., contemplated.

Approval.—Completed plans and specifications must be submitted for approval to the chief town planner and chief engineer.

STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF OVERHEAD ELECTRIC DISTRIBUTION LINES.

Pole specifications.—Wood poles shall be purchased under and conform to National Electric Light Association standard specifications for poles. Class A poles shall be used for all heavy line construction, and Class B poles for all distribution lines having the usual number and sizes of conductors.

Preservative treatment.—All poles shall be given a preservative treatment before being set. Any preservative material of known value and method of application that is generally recognized as good practice will comply with the intent of these specifications.

Other material.—All construction material of whatever nature shall conform to the standard specifications of the National Electric Light Association, except in cases where they conflict with the requirements of regulating bodies having jurisdiction; in such cases the requirements of the controlling body shall govern.

Location of poles.—The location of poles will be as shown on plan No. —. It is intended that this plan shall show only the general location, and it is understood that some variation may be necessary to meet conditions. Poles shall be set opposite lot lines as far as possible, but in all cases so as to avoid obstructing doorways, windows, porches, gates, coal holes, and runways, and be at least 4 feet away from any fire hydrant.

Pole spacing.—The maximum span shall be 150 feet, and then only where the wires are few and light. Span length of not over 100 or 125 feet are preferable.

Heavy poles.—The heaviest poles shall be placed at line terminals, corners, street crossings and other points of special strain, and

at such points the depth of pole setting shall be increased at least 6 inches over standard depth. Standard depths are as follows:

	Feet.
35-foot poles.....	5.5
40-foot poles.....	6
45-foot poles.....	6.5
50-foot poles.....	6.5
60-foot poles.....	7

Clearing obstacles.—To clear obstacles, such as buildings, foreign pole lines, bridges, etc., poles shall be used of ample height and so located that there will be at least 3 feet measured horizontally and not less than 8 feet measured vertically between the obstacles and the nearest line wire.

Line level.—The length of poles shall be so proportioned to contour of country or adjacent poles of exceptional height that abrupt changes in the level of the wires will not occur, especial care being taken to avoid upward stresses.

Pole setting.—Poles shall be set to stand perpendicularly when the line is completed except that poles may be slightly "raked" against strain at points where it is impracticable to guy against the strain. Holes shall be thoroughly tamped while being filled, using three tamping bars to one shovel.

Self sustained.—All poles located at curves, corners and terminals or other places of excessive strain where guying is impracticable, shall be self-sustained by means of crib bracing.

Pole steps.—All poles carrying section fuses or switches, transformers or other attachments requiring frequent attention shall be stepped. Commencing 2 feet from the ground line the steps shall be located 32 inches apart on each side of the pole, steps on one side being spaced midway of the steps on the other side. The first four steps shall be removable and only the sockets left on the pole, the rest to be standard galvanized pole steps. Pole steps shall always be placed on the line with the street in which the pole is located.

Cross-arms.—Each cross-arm shall be fitted with two braces of proper length. They shall be attached to poles by through bolts of proper length. The back of the poles shall never be cut out to allow the use of a shorter bolt, and bolt ends that protrude more than 1 inch shall be sawed off. Cross-arms shall invariably be placed either at right angles or parallel to the line of the street on which the pole is set. They shall always be placed on the opposite side of the pole from that on which the maximum strain comes. On straight lines where the strains are approximately equal, the cross-arms shall be placed alternately on succeeding poles, first in one direction and then in the other.

Double arms.—At all line terminals, corners and other places where there is excessive strain on the cross-arm, pins and insulators, the poles shall be double armed. All poles on which two or more wires are dead-ended shall be double armed.

Buck arms.—Buck arms are regulation arms set at right angles to the line arms usually midway between the line arms. There is no objection to the use of one single or double buck arm when the line arms are spaced 2 feet or more on centers. But if more than one buck arm is necessary the line-arm spacing must be increased to meet the climbing and working-space requirements of the United States Bureau of Standards Overhead Line Specifications. Where more lines lead off at right angles than can be carried on one arm, two-pole angle construction is preferable.

Pins.—Each cross-arm shall be fitted complete with pins and no holes shall be left vacant. Each pin shall be fastened to the cross-arm by a six penny nail driven not quite home, but projecting about one-eighth of an inch.

Guys.—Guys shall, in general, be installed when the wires tend to pull the pole or cross-arm out of place. The guys shall be placed to counteract the strain of the wires attached to the pole or cross-arm and prevent it from being pulled from its proper position.

In addition, guys shall be placed on poles that owing to their location are unduly exposed to heavy winds. Line-terminal poles shall be guyed against the strain of the lines. Preferably the pole next to the terminal pole shall also be guyed from its top to a point near the base of the terminal pole. Corner poles shall be both head and side guyed. Poles on steep hills shall be head guyed to take the down-hill strain of the line off the poles.

Guy attachments.—All guy wires shall preferably be attached to poles, guy stubs, trees, or other ungrounded supports, and when so attached shall not reach within 8 feet of the ground. Where this can not be done, guy anchors may be installed. Anchor guy wires that are so close to the street as to offer in any way an obstruction to traffic should be protected with an anchor shield. This shield may consist of 2-inch pipe or larger or a wood box or wood moulding. This shield shall extend to the ground from a height of about 8 feet and shall be painted a conspicuous color. Whenever the strain on the guy is excessive (10,000 pounds and over), guy shims and guy hooks shall be used where the guy wire is wrapped around the poles.

Location of guys.—The guy anchor shall be so located that the angle between the guy and the pole shall be from 30 to 45°. In no case shall the distance from the foot of the pole to the foot of the guy be less than one-fourth of the height from the ground to the point of attachment of the guy on the pole.

Tree guying.—Where guys can not be conveniently attached to pole or guy stubs, trees may be used if there is no objection on the part of the owners or the proper authorities, whose permission must first be obtained. Guys shall be attached to trees by means of fetter-threaded eyebolts five-eighths by 4 inches, or if wrapped around the trunk or limb same must be protected by hardwood tree blocks. The first method does not injure the trees and is preferable.

Clearance of guys.—Guys shall be attached to poles so as to interfere as little as possible with workmen climbing or working thereon. Every guy which passes either over or under any electric wires other than those attached to the guyed pole shall be so placed and maintained as to provide a clearance of not less than 3 feet between the guy and such electric wires. As changes in temperature will affect the sag of the wires more than of the guy, the latter being under strain, allowance must be made therefor at the time the guy is installed.

Strength of guys.—Anchorages, guy wires, strain insulators, and attachments shall be able to meet the tensile strength requirements of the United States Bureau of Standards Overhead Line Specifications.

Guy insulation.—All guy wires attached to poles for carrying electric wires shall be insulated by the insertion of two porcelain ball strain insulators. They shall be so located that if the guy should break the upper insulator would clear any wires below it as much as 6 inches, and the lower one would be at least 8 feet above the ground line.

Clearance.—The clear space between the crown of the road and the wires crossing the same shall always conform to local ordinances or rules, but in no case shall it be less than 20 feet. The clear space between sidewalk and wires shall not be less than 15 feet. All guys crossing a roadway shall be carried at an elevation of not less than 20 feet above the crown of the roadway, and not less than 15 feet above the footway. Wires of all kinds shall clear railroad tracks, sidings, etc., not less than 28 feet. These clearances apply for 15,000 volts or less. For higher voltages up to and including 22,000 add 2 feet to the above figures in every case. No soft-drawn wire shall be used in crossing railways except that No. 4 or larger can be used in short span secondaries (less than 150 feet). Line wires shall clear all roofs by not less than 8 feet, and they shall be so run that they can not be readily reached from any portion of any other building or structure. If conditions require that they be

attached to structures as, for example, in running under a bridge, they should be protected, with sufficient insulation for the voltage carried, for the entire distance where attached to the structure and to a point on either side of the structure that will be beyond the reach of anyone working thereon.

Transformers.—Transformers shall preferably be located approximately in the middle of each block unless for special conditions requiring short secondary runs. They shall be so located with reference to size and length of secondary circuits that the line drop from the secondary transformer terminals to any end of the secondary circuits shall not be greater than 3 volts. Transformers should never be located on angle or corner poles if it can be avoided. Each transformer shall be protected by lightning arresters located on the same pole.

Services.—From 1 to 5 circuits of a lighting load may be fed with No. 8 wire on 2-wire services and up to 9 circuits on 3-wire services. No. 6 wire will feed from 6 to 9 circuits 2-wire and up to 13 circuits on 3 wires. No. 4 wire will feed 13 circuits on 2 wires.

SIZES OF WIRE TO USE FOR MOTOR SERVICES 220 VOLTS.

- 0-2 horsepower, single-phase, No. 8.
- 3-5 horsepower, single-phase, No. 6.
- 0-15 horsepower, three-phase, No. 8.
- 15-25 horsepower, three-phase, No. 6.
- 25-35 horsepower, three-phase, No. 4.
- 35-50 horsepower, three-phase, No. 2.

Larger conductors must be used than given above if necessary to make the number of horsepower capacity of the motor, multiplied by the number of feet from the beginning of the service to the motor, not greater than the amounts given in the following table.

220 volts.

Size wire.	Horsepower-feet.	
	Single-phase.	Three-phase.
No. 8.....	1,000	2,000
No. 6.....	1,500	3,000
No. 4.....	2,250	4,500
No. 2.....	3,150	6,300
No. 0.....	5,000	10,000

NOTE.—This table is based on average motor efficiencies and power factors and single conductors with usual open spacing. If all conductors are placed in conduit or if multiple conductor cables are used, these values may be exceeded.

EXAMPLE.—A 10-horsepower three-phase 220-volt motor is to be connected 400 feet away from the pole line. $10 \times 400 = 4,000$ horsepower-feet. Referring to the table in the three-phase column, we find that No. 4 wire will be required.

Grounding.—Ground connections shall be made at the following points on all distribution systems:

One side of each 110-volt 2-wire secondary circuit.

The neutral wire of 110-220-volt 3-wire single-phase secondary circuit.

The ground terminal of each lightning arrester.

Secondary grounds.—At least one secondary ground shall be made for each transformer or bank of transformers whose secondary voltage is less than 150, as near them as practicable but not on the transformer pole. Additional grounds should be made for secondary lines over 500 feet in length. Grounds made to metallic water pipes in the street or to service pipes on the street side of the water meter are preferable to any other kinds and should be made where practicable. Where this method is impracticable, driven

pipe grounds should be made as follows: Two 1-inch galvanized pipes or larger, approximately 8 feet long, shall be driven into the ground about 1 foot apart and 1 foot away from the pole until the tops are practically level with the ground line. A short piece of sewer or drainage tile shall be placed around each, the top of the tile being flush with the ground lines. This tile should then be filled with salt crystal and the ground wire attached to the pipe. To keep this ground in good condition it will be necessary to add periodically a few handfuls of salt crystal. The ground wire shall not be less than No. 6 soft drawn T. B. W. P. wire and, in some cases, larger on heavily loaded secondaries. This wire is to be soldered to the line to be grounded and thoroughly taped and then run down the pole and protected by wooden molding throughout the entire length of the wire, and securely attached to the ground pipe. The joint should be thoroughly painted with black asphaltum paint, as otherwise the salt will corrode it.

Arrester grounds.—Grounds for lightning arresters shall always be kept entirely separate from secondary grounds and shall be at least 20 feet away from any other artificial grounds. Low impedance is more important than low resistance for lightning arrester grounds, and water-pipe grounds might not necessarily be the best grounds for lightning arresters. The best method is the one that will give the shortest and straightest path from the arrester to the ground and will in most cases be a driven pipe ground, as described for secondary grounds. Only one pipe is necessary for grounding arresters, whereas two are required for grounding secondaries.

Sectionalizing lines.—Fuse switches or cut-outs should be located at points where branch lines of any considerable importance take off from main feeders, so that trouble at one point will interfere with service over as small an area as possible. Such switch or cut-out should have ample capacity to carry the maximum current and voltage without heating or breaking down, and should be capable of frequent opening and closing at full load without danger to the operator and without deterioration of the current-carrying parts.

J.—TENTATIVE INSTRUCTIONS TO DESIGNERS FOR THE STREET IMPROVEMENTS OF INDUSTRIAL HOUSING DEVELOPMENTS.

CONSIDERATIONS AFFECTING THE DESIGN OF STREETS AND PAVEMENTS.

1. **Policy.**—The general policy of the Housing Bureau will be to introduce street pavement of a reasonably permanent character where it is necessary but not to the detriment of the budget allowances for houses in locations where good subsoil drainage is naturally available and where the surface soil is easily compacted. Street pavement, particularly in residence sections, can, under some conditions, be omitted altogether and in other cases can be materially lessened in cost. Some street pavement is almost always desirable in business and through traffic streets. In the proposed developments and in particularly wet or muddy districts, street pavement is a necessity which can not ordinarily be neglected.

2. **Classification.**—In most of the housing developments there will probably be two types of streets, (a) the main thoroughfares of travel leading to the adjacent towns, cities, or industrial works, and (b) the lateral streets serving the residents.

As a basis for design in adopting types of pavement, the following classification of streets is suggested:

CLASS A.—Main thoroughfares and first-class business streets, provision for two car tracks.

CLASS B.—Secondary thoroughfares and secondary business streets, provision for one car track.

CLASS C.—Main residence streets.

CLASS D.—Minor residence streets. (See § 19, Type and width of streets.)

3. *Location*.—Primarily, the location, arrangement, and class of streets and thoroughfares is a matter to be determined by the town planner, based upon his investigation of the service required for the existing or probable population. There are a number of physical factors in the location of streets which affect engineering, such as the cost and speed of construction and type of pavement to be adopted. The factor, second in importance only to the service requirements, which governs the economical location and arrangement of streets is usually the topography. Streets should ordinarily be located to fit the ground, so as to conform to permissible grades with the least amount of earthwork. To illustrate: A curved or diagonal roadway between high and low ground will often reduce the grade and amount of excavation and serve traffic purposes just as well as a street running directly up a steep hillside.

4. *Relation of streets and sewers*.—Sewers are of necessity laid in the public streets or alleys. The location of streets in many cases may be adjusted to meet drainage requirements in obtaining direct routes and to reduce the depth of trench excavation without interfering with their service. (See § 8, "Grades," and § 12, "Drainage".) In some situations it may be necessary to locate a street to serve primarily as a right of way for an outlet sewer or a storm overflow.

5. *Location to be avoided if possible*.—It is obvious that streets located across ravines, ditches, and the lines of drainage cost more for culverts and grading than the streets which parallel the line of drainage.

6. *Pocket avoided*.—Wherever possible, streets should not be located where the grade line makes a depression or pocket, on account of the additional cost and difficulty of securing adequate surface drainage.

7. *Relation of street surface to the general level*.—It is desirable to have street surfaces below the elevation of adjacent property rather than above, as it reduces the depth of excavation required for sewers and house connections and generally adds to the appearance of the street. This consideration is of especial importance on streets near the upper end of the drainage area.

8. *Grades*.—While it is true in some locations that street grades exist as steep as 17 per cent or even 20 per cent, the ordinary grade should, however, seldom exceed 7 per cent where it can be controlled.

In general, the maximum grades should not, if possible, exceed the following slopes: Class A streets, 3 per cent; Class B streets, 4 per cent; Class C streets, 4 per cent; Class D streets, 7 per cent.

9. *Ruling grade*.—The ruling grade partially governs the type of pavement to be selected. The following are the usual maximum grades for different pavements: Wood block, 3 per cent in general, 4 per cent maximum; asphalt, 4 per cent; asphalt block, 6 per cent; vitrified brick, 8 per cent; concrete, 6 per cent; macadam, 5 per cent; bituminous macadam, 5 per cent; bitulithic, 5 per cent. (Note.—It is difficult to roll macadam properly or to prevent wash on steeper grades.)

10. *Vertical curves*.—Vertical curves should preferably be made at points of abrupt change of grade.

11. *Street intersections*.—In platting street grades on hillsides it is suggested that the grade at intersection of streets be made as nearly level as possible. At crossings where different classes of improvements intersect on hillsides, the higher class street should have the preferred treatment, thus preference should be given to Class A or B street over Class C or D.

12. *Drainage*.—A fundamental requisite for the maintenance so any road is good underdrainage. In the inspection of a site during dry season a roadway may be apparently located on a firm foundation which will turn out to be a mire or even be overflowed in wet periods.

13. *Underdrains*.—Where no storm water sewers are to be provided, underdrains, running from the center of the road to the

side ditches, should ordinarily be laid in cuts where the ground is soft or in pockets or depressions in the grades. The use of 6-inch open joint tile or blind drains of 12 by 12 inch cross section, filled with broken stone, laid just below the pavement is suggested. Underdrains should be laid at right angles to the road in level country and diagonally when the road is on a slope, so as to increase the fall.

14. *Side ditches and drains*.—Open ditches or tile drains may be required on one or both sides of the road to drain depressions in the grade or to take care of the surface drainage from any considerable drainage area. Whether open ditches or tile or other form of covered drain should be used should depend not only upon the size of drainage area but also upon the number of dwellings existing on the street.

15. *Size of ditches and drains*.—It is often desirable that the size of open ditches and side drains should be determined by computing the run-off according to the method of rainfall intensity specified under storm water sewers. In general, if the drainage area exceeds 2 acres or if the water runs deeper than the top of the curb, some type of lateral drain or storm sewer is required. (See also § 24, "Gutters," and § 25, "Inlets.")

16. *Culverts*.—Culverts are naturally required at certain points to prevent water from gutters flowing over the surface at street intersections, on hillsides, and at points where the streets cross ditches, small streams, or lines of surface drainage.

17. *Sizes of culverts*.—Such culverts should be of capacity sufficient to carry the water from the drainage area as computed by the method of determining run-off for storm sewers but, unlike sewers, the size of culverts may be computed on the basis of flowing under pressure with any available head that will not seriously overflow the street or adjacent property.

18. *Culvert material*.—While permanent materials are usually desirable culverts should be made of local materials most available. Vitrified tile, concrete pipe, concrete box or even in some cases wood box, may be properly used. Cast iron should not be used except when it is impossible on account of insufficient cover under traffic to use less strong material.

19. *Type and width of streets*.—The following list of four standard classes of streets is suggestively presented as a guide for reference, but the designer is not to be restricted by these dimensions where local circumstances indicate other or intermediate widths of either street or pavement is desirable:

Class.	Width of pavement between curbs.	Width of parking.	Width of sidewalk.	Width of street.
CLASS A.—Main thoroughfares and first-class business streets; provision for 2 car tracks.	1 54	12	1 12	16
CLASS B.—Secondary thoroughfares and secondary business streets with provision for 1 car track.	1 42	7	1 6	70
CLASS C.—Main residence streets.	1 32	8 1 2	4 1 2	60
CLASS D:				
Minor residence streets.	20	5 1 2	3 1 2	40
Alleys.	10			10

¹ Maximum

Sidewalks are usually set 1 foot from private property. See cross sections of "Standard streets" (p. 473 and p. 501).

20. *Basis for widths*.—The basis for the tentative pavement widths in the foregoing table is made on the assumption that a double-track street car line occupies 20 feet, and that each line of traffic occupies 8 feet of width. A vehicle backed up to the

curb occupies 13 or 14 feet and ordinarily a vehicle can pass another one closely in 7 feet of width. Thus:

$$54 = 8 \times 4 + 20 + 2 \text{ feet leeway.}$$

$$42 = 8 \times 4 + 10.$$

$$32 = 8 \times 4.$$

$$20 = 13 + 7.$$

Ordinarily a 16-foot alley will allow two vehicles to pass and still permit of space for electric pole lines.

In the adoption of street widths consideration should be given to the possibility of increased widths of pavement in future development.

21. *Crown and cross section.*—It should be noted that as the crowning of street pavements is for the sole purpose of drainage, less crowning, at least on impervious surfaces, is required on steep grades than on level streets. Likewise less crowning is required at summits than at sewer inlets or near the lower points where the surface water of a considerable area is collected. Ordinarily an impervious pavement surface requires less crown than does a dirt road.

22. *Standard crowning.*—In the absence of special local governing conditions, the following crowning is suggested: Earth and gravel roads, $\frac{3}{4}$ inch per foot of width from center to edge of roadway or curb.

Water-bound macadam. . . . $\frac{1}{2}$ inch per foot.

Bituminous macadam. . . . $\frac{3}{8}$ inch per foot.

Concrete pavement. . . $\frac{1}{4}$ to $\frac{3}{8}$ inch per foot.

Vitrified brick on sand. . . $\frac{3}{8}$ inch per foot.

Vitrified brick, monolithic. $\frac{1}{4}$ inch per foot.

23. Crown to conform to parabola or arc of circle.

24. *Gutters.*—It is suggested that a gutter with grade of 1 per cent (on the assumption of a cross section of about 6 inches deep and 4 feet wide) will carry the drainage of about 2 acres on a length of street not exceeding 1,500 feet. In territory not supplied with storm water sewers, this indicates that some form of protected ditch is often required in flat country for runs of over 1,500 feet.

25. *Inlets.*—In territory where quite flat slopes prevail, inlets should preferably be placed as often as one in 200 or 250 feet. For steeper street grades inlets 300 to 350 feet of street length. (See "Storm Water Drains," p. 453.)

If the street grade is not quite level the topography will usually govern the best location of inlets.

26. *Gutter grades.*—In most cases of sloping topography the street grade and gutter grades will be parallel. If the street is fairly level, it will be usually desirable to give some fall to the gutters between inlets in order to avoid collection of water in any minor irregularities and to assist run-off. In these cases a grade of 2 per cent from a summit midway between manholes is suggested where possible. (See "Curbs," §§ 11-16.)

27. Usually it is best to keep the center of the street to grade line and let the amount of gutter grade reduce the height of crown to a minimum of one-fourth inch per foot.

28. *Cross section with ditches.*—Where open ditches are used, it is desirable to grade down from the edge or shoulder of roadway on a 1 to 2 $\frac{1}{2}$ slope for a distance up to 2 $\frac{1}{2}$ feet before establishing any steeper side slope.

29. For paved roadways adjacent to ditches, it is desirable to make the width of roadway not less than 2 to 3 feet greater than the width of the paved surface on the side adjacent to the ditch in order to maintain a firm shoulder under rolling.

STANDARD PAVEMENTS.

1. *Local conditions.*—The type and thickness of pavements outlined here are presented as suggested standards in the absence of exact knowledge of local conditions, such as availability of special materials and unusual soils or foundations, which may require a change in adopted standard thickness of pavement.

2. *Earth roads.*—The cross section of the roadway should usually be graded in accordance with standard crown of three-fourths inch per foot (on half road width) and ditches. (See p. 475.)

3. *Gravel roads.*—For ordinary gravel roads the gravel should be placed 6 inches for average compacted thickness, and the crown should ordinarily be three-quarters inch per foot.

4. *Water-bound macadam.*—For ordinary water-bound macadam the suggested final thickness is about 6 inches, composed of broken stone or slag rolled in two courses. The bottom course is to be spread 5 inches deep with stone, 2 to 3 $\frac{1}{2}$ inches in diameter, and the top course spread 3 inches deep with stone, 1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ inches in diameter. Finished surface, if rolled with screenings composed of dust to one-quarter inch size, is to have a crown of one-half inch per foot.

NOTE.—When the stone or slag has a French coefficient of wear of nine or more, the top course should consist of stone three-fourths to 1 $\frac{1}{2}$ inches diameter.

5. *Bituminous material.*—It is probable that bituminous binding material and asphalts will not be available generally. Therefore, no standard is presented. In such places as local stock may be used the following procedure is suggested.

6. *Bituminous macadam (penetration method).*—Final thickness suggested, 7 inches. Rolled in two courses of broken stone or slag. Bottom course spread 5 inches deep with 2 to 3 $\frac{1}{2}$ inches stone. Then sand or screenings rolled in. Upper course compacted 2 inches deep with 1 to 2 inches stone and covered with bituminous material spread with a pressure distributor. Bituminous material heated to 225 to 350° F., and ordinarily about 1.7 gallons used per square yard. Then five-eighths to 1 inch stone rolled in to fill voids. After which a coat of bituminous material applied at rate of about 0.6 gallon per square yard. Final coat of screenings without dust rolled in. Crown for bituminous macadam three-eighths inch per foot. (For half road width.)

7. *Kentucky rock asphalt.*—Kentucky rock asphalt may be available for Ohio Valley localities.

8. *Concrete.*—For ordinary concrete pavement it is suggested that Portland cement concrete be used in proportions of 1 cement to 5 of aggregate. Thickness 6 inches at outside edges or gutters. Base flat. Crown one-fourth to three-eighths inch per foot, all in surface. (See standard drawing, p. 476.)

9. *Vitrified brick.*—For brick pavement make foundation of Portland cement concrete in proportion 1-3-6 and at least 5 inches thick. Bed of sand one-half to three-fourths inch thick. Brick laid on edge and treated twice with cement mortar mixed 1 to 1 or 1 to 1 $\frac{1}{2}$. Expansion joint along edge of curb composed of bituminous material.

When the street grade is over 2 $\frac{1}{2}$ or 3 per cent, the use of sand-cement cushion is desirable. When car tracks exist, or in the case of extra heavy traffic, the use of monolithic or semimonolithic construction is preferable.

10. *Rolled foundation.*—Ground generally to be compacted by rolling for standard macadam, concrete, and brick pavements.

11. *Use of curbs.*—Curbs are not essential for any of the standard types of pavement. Brick pavement on sandbed, without curb, however, must have shoulders of concrete built up from the foundation concrete to level with the top of brick. The use of curb is dependent upon the character and number of houses along the street and the general character of the development. Curbs serve to define traffic from the parking and sidewalks and make for better drainage of street surfaces, especially where storm water sewer inlets are provided. They add greatly to the appearance of the street.

12. *Curb elevation.*—It is suggested that the tops of curbs should be from 5 to 8 inches for ordinary height above gutter and be parallel to the street grade. Standard combined curb and gutter to be uniformly 6 inches above the gutter grade where possible.

[13 omitted.]

14. *Curb section.*—The standard curb should be in accordance with the specifications of the National Association of Cement Users, 6 inches thick at top, 12 inches thick on bottom and batter on street side of 1 to 4. Made of concrete mixed one part cement to four parts aggregate, joints 5 to 8 feet apart.

15. *Combination curb and gutter.*—The standard combination curb and gutter should be in accordance with the specifications of the National Association of Cement Users, 12 inches high and 24 inches wide; six inches thick on the top, which is uniformly 6 inches above the gutter grade. (See p. 477.)

16. *Stone curb.*—The use of stone curb is suggested when local material makes this economical.

17. *Selection of type pavement.*—The type of pavement to be selected is governed by: (a) Amount of traffic; (b) character and number of houses and residences on street; (c) character of soil, foundation, and grades; (d) cost and availability of local and other paving material.

Considering the standard types, class A and B streets ordinarily call for brick, concrete or bituminous concrete surfaces; class C streets, bituminous macadam, bituminous surface treated or macadam; and class D streets, macadam, gravel, or earth surfaces.

18. *Local conditions to govern.*—This selection is only conventional. Local circumstances, such as availability of materials and relative costs of construction, will govern selection of pavement type. In some situations, especially with firm or gravel-filled ground and good surface-drainage conditions, pavement may be omitted or deferred on class C and D streets.

It is to be noted that grades have some influence on selection of type. It is obvious that brick stands surface wash on streets with steep grade better than macadam and also usually furnishes better foothold than a concrete surface. When local material will furnish a special type of economical pavement, it is to be used in place of these standards. Local availability of material is practically the main consideration in selection of type of pavement.

19. *Standard sidewalks.*—Ordinarily concrete walks should consist of concrete 5 inches thick 1-3-6, finish $\frac{3}{4}$ inch thick 1-2. Slope on grade 1 inch in 3 to 4 feet from top of curb, or from elevation at which curb would be placed, except at points near intersections where steep street grades otherwise govern. Expansion joints should be used at curbs. See standard specifications for concrete walks dated September 27, 1918.

20. *Cinder and other walks.*—In some situations it may be desirable to spread cinders for a cheap walk at proper grade which can be later used as the base for a concrete walk, and under certain conditions the ordinary width of concrete walks (6 feet) can be reduced.

21. *Brick walks.*—The selection of kind of sidewalk to be used depends mainly on the money available and the necessities of residents, considerations which of necessity modify the selection of many municipal improvements. Brick can be and often is useful for sidewalks, as well as other material.

22. *Street intersections.*—It is suggested that curb lines on street intersections be made on radius of about $5\frac{1}{2}$ feet.

23. *Crossings.*—It is suggested that where location of inlets and gutter drainage will permit (so that little or no surface water need pass corner) the crown of pavement opposite ends of sidewalks be reduced to a minimum of $\frac{1}{4}$ inch per foot to reduce height of step to top of curb or walk.

24. *Alleys.*—Five inches concrete mixed 1 to 5. Dish section. For ordinary situations, a gravel roadway should answer.

MEMORANDUM AS TO USE OF BLAST FURNACE SLAG FOR ROAD SURFACING.

To all District and Project Engineers:

GENTLEMEN: Your attention is called to the following memorandum prepared by the Engineering Division of this office:

Blast furnace slag may be used successfully for surfacing streets. However, there are what are termed acid and basic slags. The acid slag is not satisfactory to be used in wearing surface without an artificial binder, as it has no cementing qualities of its own.

The basic slag is satisfactory for such purposes, as it has cementing qualities. To use slag for such purpose it should be crushed in a regular stone crusher and screened to sizes, similarly as stone. In constructing the street surface the slag should be spread and rolled similarly as crushed stones.

The following specifications are suggested:

General.—The broken slag shall consist of angular fragments, reasonably uniform in density and quality, free from metallic iron, thin or elongated pieces, dirt, or other objectionable matter.

Physical properties.—The slag shall meet the following requirements: Weight in pounds per cubic foot, each size specified, not less than 70. French coefficient of wear, not less than 5.

Screenings.—That portion of the product of the crusher, including the dust of fracture, which, when tested by means of laboratory screens, will meet the following requirements: Passing 1-inch screen, not less than 95 per cent; total passing $\frac{3}{4}$ -inch screen, 40 to 80 per cent.

Coarse slag.—That portion of the products of the crusher which when tested by means of laboratory screens will meet the following requirements: Passing 3-inch screen, not less than 95 per cent; total passing 2-inch screen, 25 to 75 per cent; retained on 1-inch screen, not less than 85 per cent.

Method of testing.—The tests of the physical properties and sizes of the slag shall be made in accordance with the following methods: (1) Weight per cubic foot, United States Department of Agriculture Bulletin 555, page 32 (6); (2) French Coefficient of Wear, United States Department of Agriculture Bulletin 347, page 5; (3) Grading, United States Department of Agriculture Bulletin 555, page 32 (8).

SPECIFICATION FOR SURFACING A STREET WITH CRUSHED BLAST FURNACE SLAG.

SUBGRADE.

The subgrade, or that portion of the street upon which the surfacing material is to be laid, shall consist of good earth brought to the proper elevation, alignment, and cross section, and shall be rolled, until firm and hard, with a roller of the macadam type weighing not less than 10 tons and not more than 15 tons. Should earth be encountered which will not compact by rolling, so as to be firm and hard, it shall be removed and replaced with suitable material, and that portion of the subgrade shall be again rolled. When the rolling is completed, the surface of the subgrade shall conform to the cross section shown on the plans and shall have the proper elevation and alignment and shall be so maintained until the surfacing material is in place.

CRUSHED SLAG SURFACE.

On the subgrade, prepared as herein specified, shall be constructed a crushed slag surface of the cross section and number of courses shown on the cross section drawings, and each course when compacted shall have the thickness shown on the drawings.

CRUSHED SLAG.

The crushed slag used in this work shall be clean, sound, durable, sharp angled, and of uniform quality throughout, and shall meet the following requirements for sizes and quality:

Slag sand.—All that portion of the product of the crusher which will pass through a screen having one-quarter inch circular openings, including the dust of fracture.

No. 2 slag.—All that portion of the product of the crusher which will be retained on a screen having $1\frac{1}{2}$ -inch circular openings and

will pass through a screen having circular openings 3 inches in diameter.

No. 1 slag.—All that portion of the product of the crusher which will be retained on a screen having circular openings $2\frac{1}{4}$ inches in diameter, and will pass through a screen having circular openings 4 inches in diameter.

A sample of the slag when subjected to the toughness, abrasion, and cementing value tests, as described in United States Department of Agriculture Bulletin No. 347, shall satisfactorily meet the following requirements: Toughness, not less than 6; per cent of wear, not more than 7; and cementing value not less than 35. The weight per cubic foot of the crushed slag shall be not less than 65, nor more than 80 pounds.

FIRST COURSE.

The first course shall consist of a single layer of No. 1 slag, spread uniformly to such depth that when compacted it will have the thickness shown on the cross-section drawings. The slag shall be spread by hand from dumping boards or by spreading wagons of a type that will distribute the slag evenly over that part of the subgrade to be covered by the load. To secure a proper thickness of the layer the contractor shall, if required by the engineer, set wooden blocks about 6 inches square and of a height equal to the required depth of the loose layer on the subgrade and shall spread the slag flush with the tops of these blocks. After the slag has been spread, as above specified, it shall be rolled until it is thoroughly compacted and firm. The rolling shall begin at one edge of the course, and shall progress gradually to the center of the street in such a manner as to insure the uniform compacting of the course of slag. The rolling shall then begin at the opposite edge and proceed as above. All irregularities and depressions that may develop shall be corrected immediately with No. 1 slag, which shall be thoroughly compacted by rolling, so that when the course is completed it shall be well compacted and firm and shall conform to grade and cross section. It shall be so maintained until the second course of slag has been spread.

SECOND COURSE.

After the first course has been rolled as specified, a second course of slag consisting of a single layer of No. 2 slag shall be spread uniformly to such a depth that when compacted it shall have the thickness shown on the cross-section drawings. The methods specified for spreading, rolling, and correcting irregularities and depressions in the first course shall apply to this course.

Applying slag sand, sprinkling, and rolling.—After the second course of slag has been rolled and compacted, as above specified, slag sand as herein specified shall be spread thereon with shovels to a uniform depth of about one-half inch from piles along the street, or from dumping boards or carts. In no case shall the slag sand be dumped from wagons directly upon the second course. The slag sand shall then be rolled dry until the voids of the second course are well filled, more slag sand being spread as needed to fill the voids, and shall then be sprinkled with water from properly constructed sprinkling wagons and rolled with a power roller of the same type and weight as specified for the first course. The amount of water used shall be sufficient to wet the slag thoroughly, but shall not be put on in such quantity and manner as to wet and soften the subgrade.

Additional slag sand shall be added and sprinkling and rolling shall be continued until the street surface ceases to show the marks of the roller and a grout of water and slag dust flushes ahead of the roller. The entire surface shall then be given a final light coat of slag sand and may be opened to traffic after 24 hours.

MAINTENANCE.

The contractor for street surfacing shall maintain the roadway surface in first-class condition during the entire period of his contract.

If after the roadway is opened to traffic and during the period of the construction of the project, there appears any deterioration, or any injury or damage occurs, whether the same be due to defective work or materials or action of the elements, ordinary or extraordinary wear or tear, or to any other cause whatsoever, the roadway shall be kept constantly in first-class condition in accordance with the directions of the engineer, and upon completion of the project the roadway shall be left in a finished condition as required by the specifications for its completion.

MEMORANDUM AS TO MAINTENANCE OF PAVEMENTS.

To all District and Project Engineers:

Some of the heaviest traffic and wear to which the pavements of a development will be subjected will occur during the period of construction on account of hauling of construction material by heavy motors, etc. In order to maintain such streets in the development so that they will be in usable shape at the time the development is completed, you will please insert the following paragraph in all specifications:

"The contractor for street surfacing shall maintain the roadway surface in first-class condition during the entire period of his contract.

"If after the roadway is opened to traffic and during the period of the construction of the project, there appears any deterioration or any injury or damage occurs, whether the same be due to defective work or materials or action of the elements, ordinary or extraordinary wear or tear or to any other cause whatsoever, the roadway shall be kept constantly in first-class condition in accordance with the directions of the engineer, and upon completion of the project, the roadway shall be left in a finished condition as required by the specifications for its completion."

Very truly yours,

(Signed) JOHN W. ALVORD,
Chief Engineer.

STANDARD SPECIFICATIONS FOR CONCRETE SIDEWALKS—GENERAL SPECIFICATIONS—MATERIALS.

UNITED STATES HOUSING CORPORATION,

Washington, D. C., September 27, 1918.

1. *Cement walks.*—The cement shall meet the requirements of the current standard specifications for Portland cement of the American Society for Testing Materials. Concrete for sidewalks shall consist of cement, clean pure water, and fine and coarse aggregate.

2. *Fine aggregate.*—Fine aggregate shall consist of natural sand or screenings from hard, tough, durable crushed rock or gravel consisting of quartz grains or other hard material graded from fine to coarse, with the coarse particles predominating. Fine aggregate, when dry, shall pass a screen having 4 meshes to the linear inch; not more than 25 per cent shall pass a sieve having 50 meshes per linear inch, and not more than 5 per cent shall pass a sieve having 100 meshes per linear inch. Fine aggregate shall not contain vegetable or other organic matter, nor more than 5 per cent, by weight, of clay or loam.

Fine aggregate shall be of such quality that mortar composed of 1 part Portland cement and 3 parts fine aggregate, by weight, shall, when made into briquets or cylinders, in accordance with the methods and specifications for testing cement recommended by the American Society for Testing Materials, meet said requirements.

3. *Coarse aggregate.*—Coarse aggregate shall consist of clean, durable, crushed rock or pebbles graded in size, free from vegetable or other organic matter, and shall contain no soft, flat, or elongated particles. The size of the coarse aggregate shall range from 1 inch down; not more than 5 per cent passing a screen having

from 4 meshes per linear inch, and no intermediate sizes shall be removed. Crusher-run stone or bank-run gravel shall not be used.

4. *Reinforcement.*—When reinforcing metal is necessary it shall meet the requirements of the current Standard Specifications for steel reinforcement of the American Society for Testing Materials. It shall be of such size and weight and so placed as the engineer shall specify.

5. *Joint filler.*—The joint filler shall be a suitable elastic water-proof compound that will not become soft and run out in hot weather, nor hard and brittle and chip out in cold weather; or prepared strips of fiber matrix and bitumen as approved by the engineer. The strips shall be one-half inch in thickness, their width shall be at least equal to the full thickness of the slab and their length shall at least equal the width of the slab at the joint.

SUBGRADE.

6. *Preparation.*—All soft and spongy places shall be removed and all depressions filled with suitable material which shall be thoroughly compacted in layers not exceeding 6 inches in thickness. The subgrade shall be thoroughly tamped until it is brought to a firm, unyielding surface parallel to the finished surface of the walk. It shall have a slope toward the street curb preferably of one-quarter inch per foot.

When the concrete sidewalk is to be constructed over an old path composed of gravel, crushed rock, or cinders, the old path shall be entirely loosened, the material spread for the full width of the subgrade and compacted as specified.

The subgrade or sub-base shall be thoroughly moistened by sprinkling immediately before concrete is placed.

7. *Deep fills.*—All fills shall be made of good granular material. The use of muck, quicksand, soft clay, spongy or perishable material is prohibited. The top of all fills shall extend beyond the walk on each side at least 1 foot, and if fill is 18 inches or more shall extend 2 feet, and the sides shall have a slope not greater than 1 on 1½.

8. *Sub-base.*—In general no cinders or similar material will be required for a sub-base, but, if necessary in a particular case, sand or cinders, etc., may be used if ordered by the engineer.

FORMS.

9. *Materials.*—Forms shall be free from warp and of sufficient strength to resist springing out of shape, and the upper edges set to line and grade.

10. *Division plates.*—Suitable metal division plates shall be provided to completely separate adjacent slabs during construction.

11. *Treatment.*—All wood forms shall be thoroughly wetted and metal forms oiled or coated with soft soap or whitewash before depositing any material against them. All mortar and dirt shall be removed from forms that have been previously used.

CONSTRUCTION.

12. *Size of slabs.*—The slabs or independently divided blocks when not reinforced shall have an area of not more than 24 square feet and shall not have a dimension greater than 6 feet, nor shall the length of any such slab be greater than 1½ times the width. Larger slabs shall be reinforced as directed by the engineer.

13. *Thickness of walk.*—The total thickness of the walk shall not be less than 4 inches in residence districts, 5 inches in business districts, and where the walk crosses driveways the total thickness shall be increased to 6 inches.

14. *Expansion joints.*—A joint shall be provided at each intersection of sidewalk and street curb and at such other points as may be designated by the engineer. Sidewalks in business districts shall be separated from abutting buildings by a one-half inch joint.

MEASURING AND MIXING.

15. *Measuring.*—The method of measuring the materials for the concrete or mortar, including water, shall be one which will insure separate and uniform proportions of each of the materials at all times.

A sack of Portland cement 94 pounds net shall be considered 1 cubic foot.

16. *Machine mixing.*—All concrete shall be mixed by machine except when the engineer shall otherwise permit under special conditions. A batch mixer of an approved type shall be used. The ingredients of the concrete or mortar shall be mixed to the specified consistency and the mixing shall continue for at least one minute after all materials are in the drum. The drum shall be completely emptied before receiving material for the succeeding batch.

17. *Hand mixing.*—When it is necessary to mix by hand, the materials shall be mixed dry on a water tight platform until the mixture is of a uniform color, the required amount of water added, and the mixing continued until the mass is of uniform consistency and homogeneous.

18. *Retempering.*—Retempering of mortar or concrete which has partially set, that is, remixing with or without additional materials or water, shall not be permitted.

PROTECTION.

19. *Protection.*—The freshly finished walk shall be protected from hot sun and drying winds until it can be sprinkled which shall be done at frequent intervals for seven days, as directed by the engineer. The concrete surface must not be damaged or pitted by rain drops, and the contractor shall provide and use when necessary sufficient tarpaulins to completely cover all sections that have been placed within the preceding 12 hours. All new walks shall be protected by proper barriers until notified to the contrary by the engineers.

20. *Frost.*—If at any time during the progress of the work the temperature is, or in the opinion of the engineer, will within 24 hours drop to 30° or lower, Fahrenheit, the water and aggregate shall be heated and precautions taken to protect the work from freezing for at least three days.

Under no conditions can frozen material be used in the concrete, nor will it be permitted to place concrete upon a frozen subgrade or sub-base.

21. *Name stamp.*—The contractor shall mark in the walk at each end of every block fraction thereof, either by stamping or by inlaying an approved metal plate, his name and the year in which the walk is constructed. The stamped letters shall be at least 1 inch high and one-quarter inch deep. If a metal plate is used, the top of the plate shall be flush with the top of the walk.

22. *Street name.*—The contractor shall mark in the walk at each street intersection the names of the intersecting streets. The stamped letters shall be 3 inches high and one-quarter inch deep.

TWO-COURSE SIDEWALK.

CONCRETE BASE.

23. *Proportions.*—The concrete shall be mixed in the proportions by volume of 1 sack of Portland cement, 3 cubic feet of fine aggregate and 6 cubic feet of coarse aggregate.

24. *Consistency.*—The materials shall be mixed wet enough to produce a concrete of a consistency that will flush readily under slight tamping, but which can be handled without causing a separation of the coarse aggregate from the mortar.

25. *Placing.*—After mixing, concrete shall be handled rapidly and the successive batches deposited in a continuous operation completing individual sections to the required depth and width.

The forms shall be filled and the concrete struck off and tamped to a surface the thickness of the wearing course below the established grade of the walk. The method of placing the various sections shall be such as to produce a straight, clean cut joint between them so as to make each section an independent unit. The joints shall be at right angles to the surface and line of the walk. Workmen shall not be permitted to walk on the freshly laid concrete. Any concrete in excess of that needed to complete a section at the stopping of work shall not be used.

WEARING COURSE.

26. *Proportions.*—The wearing course shall be mixed in the proportions of 1 sack of Portland cement and 1 cubic foot of fine aggregate.

27. *Consistency.*—The mortar shall be of the dryest consistency possible to work with a motion of the strike board.

28. *Placing.*—The wearing course shall be placed immediately after mixing. It shall be deposited on the fresh concrete of the base before the latter has appreciably hardened, and brought to the established grade with a strike board. In no case shall more than 45 minutes elapse between the time the concrete for the base is mixed and the time when the wearing course is placed.

29. *Finishing.*—After the wearing surface has been brought to the established grade by means of a strike board, it shall be worked with a wood float in a manner which will thoroughly compact it and provide a surface free from depressions and irregularities of any kind. In no case shall dry cement or a mixture of dry cement and sand be sprinkled on the surface to absorb moisture or to hasten hardening. The division plates shall be removed as soon as the concrete has sufficiently set. The slab markings shall be made with a groover in the wearing course where the division plates were removed. The edges of the walk shall be rounded to a radius of one-half inch.

ONE-COURSE SIDEWALK.

For one-course walks the following will apply in addition to the general requirements in all the above paragraphs:

30. *Proportions.*—The concrete shall be mixed in the proportions of 1 sack of Portland cement to not more than 2 cubic feet of fine aggregate and 3 cubic feet of coarse aggregate.

31. *Consistency.*—The materials shall be mixed with sufficient water to produce a concrete which will hold its shape when struck off with a strike board.

32. *Finishing.*—After the concrete has been tamped and brought to the established grade with a strikeboard it shall again be tamped

with a special grided tamper to force all coarse aggregate a distance of at least one-half inch below the surface. It shall then be floated with a wood float in a manner which will thoroughly compact it and provide a surface free from depressions or irregularities of any kind.

Approved:

JOHN W. ALVORD,
Chief Engineer.

UNITED STATES HOUSING CORPORATION STANDARD DRAWINGS TO ACCOMPANY INSTRUCTIONS AND SPECIFICATIONS OF THE ENGINEERING DIVISION.

No.	Title.
1.	Standard filing title.
1a.	Standard lettering.
2.	Cross sections of streets.
3.	Location of utilities.
4.	Cross sections of roads.
4a.	Cross sections of roads.
5.	Curbs and gutters.
6.	Standard manholes.
7.	Catch basin and inlet.
8.	Sewage separator and digester.
9.	Standard sewer profile.
10.	Location of water mains, valves, and hydrants.
11.	Tap for house connections.
12.	Fire-hydrant installation.
13.	Lawn-meter setting.
14.	Basement-meter setting.
15.	Concrete walks.
16.	Grease trap for kitchen wastes.
17.	Catch basin grate and frame.
18.	Manhole cover and frame.
19.	Gas supply details.

These standard drawings were prepared mainly with the idea of standardizing material to be ordered and were not made up with the idea that they must be conformed to rigidly, but were to be used as a guide by the project engineers in the preparation of their plans.

The drawings represent standard practice in the installation of the various utilities. In the general instructions to the project engineers, it was pointed out that they must meet the local conditions, but were to also adhere, where possible, to these standards in order to save time and money by using materials of construction which were obtainable during the period of war.

U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
UNITED STATES HOUSING CORPORATION

STANDARD FILING TITLE

MUST BE PLACED IN LOWER RIGHT HAND
CORNER OF ALL PLANS LARGER THAN 12" X 18"

NO. 1
Revised
July 18, 1918.

NOTE
Border Line of Plan

U. S. DEPARTMENT OF LABOR BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION UNITED STATES HOUSING CORPORATION			
DULUTH MINNESOTA VAN BUREN TRACT			
RECORD	BY	DATE	SCALE 40 FT. IN.
DRAWN			
CHECKED			
APPR'D			GROUP NO. 15 DRAWING NO. E 652 PROJECT NO. 123-A
APPR'D			
DESIGNERS			MANAGER DIVISION ASSISTANT GENERAL MANAGER
ARCHITECT TOWN PLANNER ENGINEER			
APPROVED as noted Preliminary Final			
REVISED			
10 0 50 100 150			

NOTE

Each designer numbers his
own plans in sequence
(E.=ENGINEER
A.=ARCHITECT
T.P.=TOWN PLANNER

Approved *John W. Conrad*
Chief Engineer (Engineering Division)
Th. Olund
Manager (Town Planning Division)
J. M. Cook
Manager (Architectural Division)

NOTE - On very small plans filing data in
right hand column is to be used with a com-
mensurate title and space for approval.

I A
Revised
July 18, 1918

U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U.S. HOUSING CORPORATION

SPECIAL TITLES, SIZES OF SHEETS AND
TYPES OF LETTERING FOR MAPS AND PLANS

STANDARD SIZES OF SHEETS

36" x 48"
24" x 36"
18" x 24"
12" x 18"
8" x 10½" (Letter Size)
Profile 18" Wide (See Sample for
Sewer Profile)

STANDARD TYPES OF LETTERING

A B C D E F G H

a b c d e f g h i j k *a b c d e f g h i j k*

Black River

U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U.S. HOUSING CORPORATION
ENGINEERING

Topographical Map of

WILLIAMSTOWN, MAINE

For Housing Site _____ Tract

0 10 20 40 60 80 100

Scale 1" = 40'

May 16, 1918

Geo. Johnson - Civil Engineer

1120 W. Street, Boston, Mass.

U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U.S. HOUSING CORPORATION

VALLEJO-CALIF.

INDUSTRIAL HOUSING DEVELOPMENT
MARE ISLAND NAVY YARD.

GENERAL PLAN

SCALE 1" = 100'

0 50 100 200 300 400

GEORGE KELHAM P. R. JONES S. E. KIEFFER
ARCHITECT TOWN PLANNER ENGINEER
SAN FRANCISCO, CALIF. MAY 25, 1918.

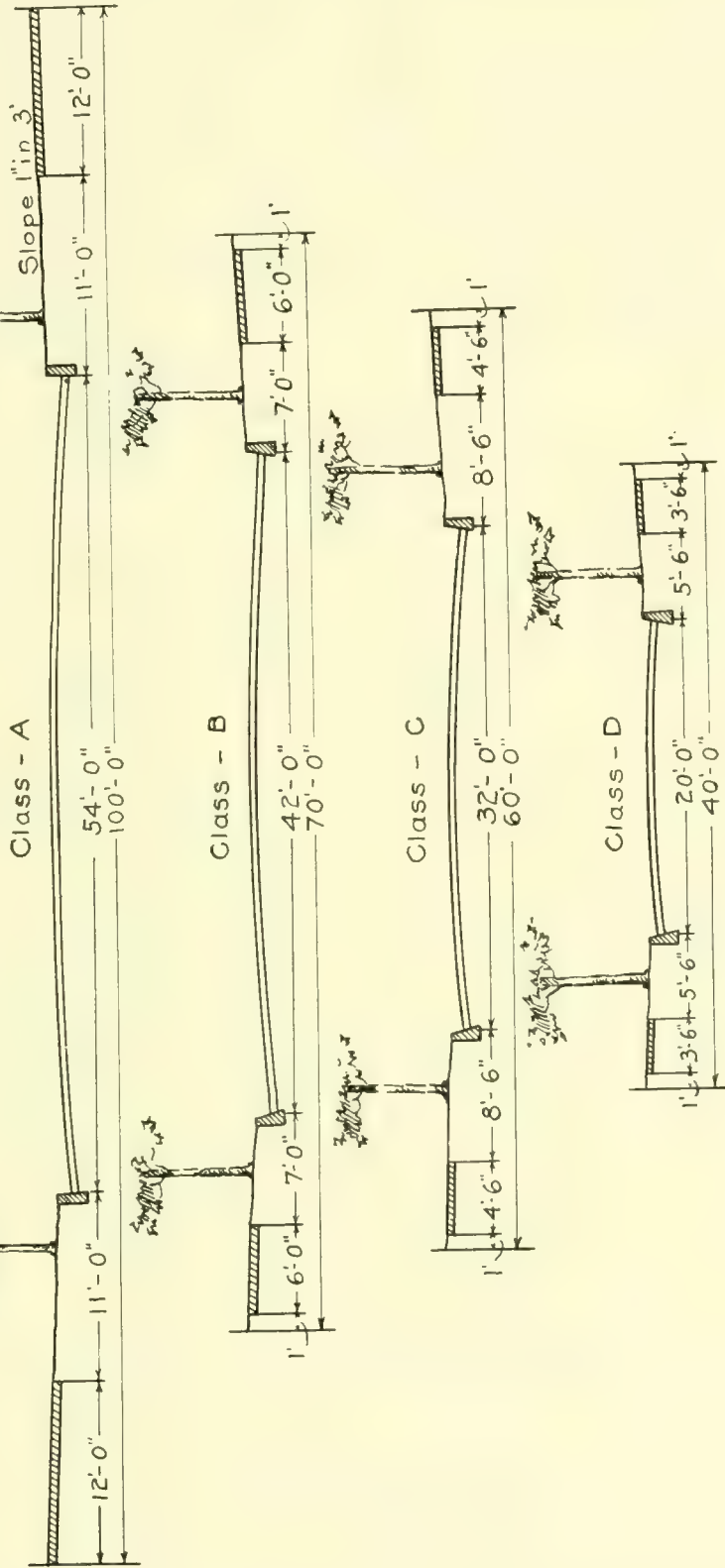
NOTE: Variation of style and size of above title may be made in accordance with appearance of plan. Standard filing title (See Housing Bureau Standards-Sheet No. 1.) must be used on all plans larger than 12" x 18". Typical titles here shown are to be used in addition to the filing title only when nature of the plan clearly demands it.

Approved

John W. Alford
Chief Engineer
(Engineering Division)
Th. Olmsted
Manager
(Town Planning Division)

2

U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U.S. HOUSING CORPORATION
ENGINEERING

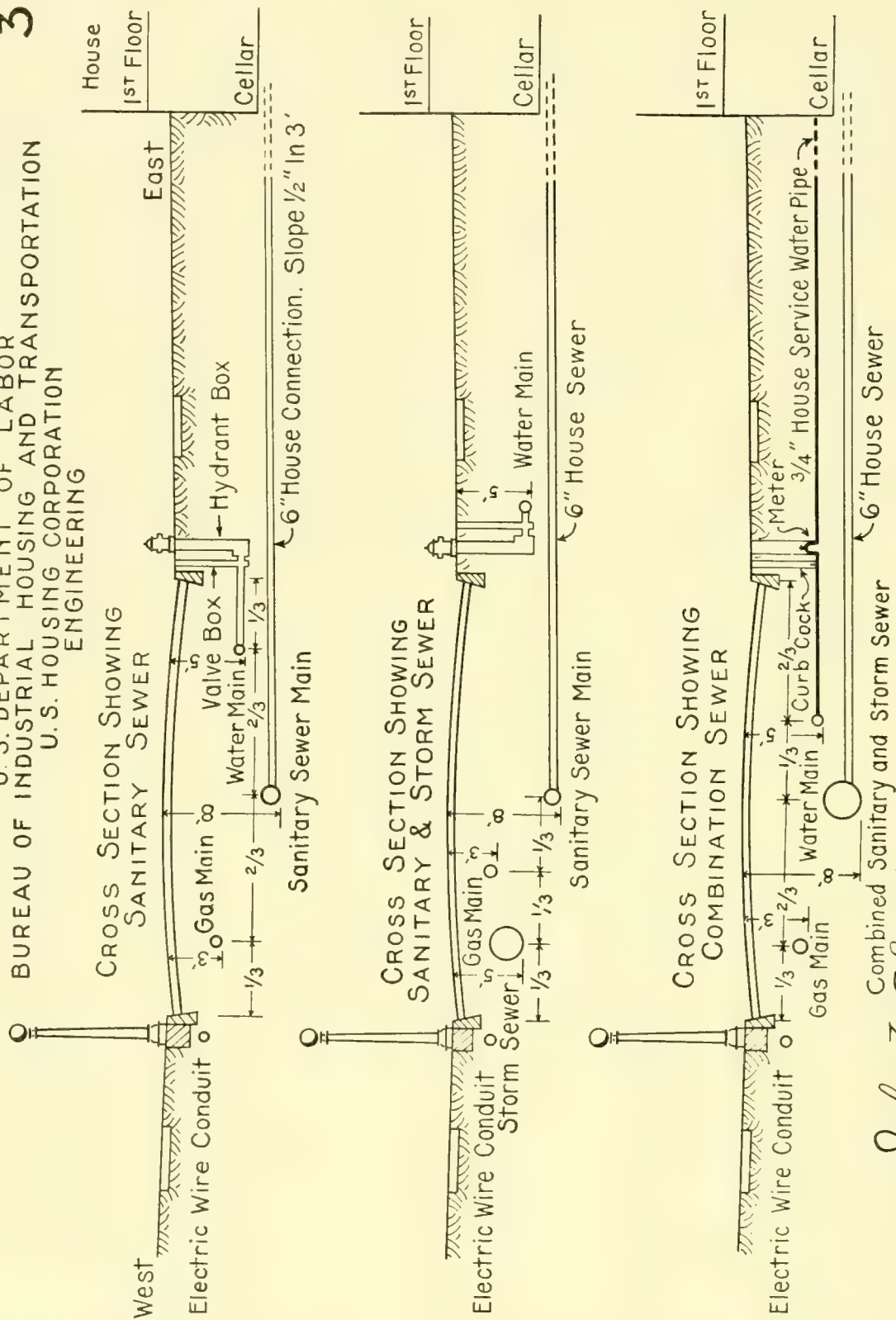


STANDARD CROSS-SECTION
OF STREETS
Scale, 1" = 10'

Note. For further and more specific classification of street dimensions, see standard drawings of Town Planning Division

3

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BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING



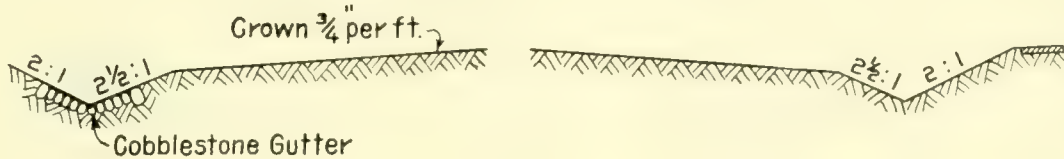
LOCATION OF UTILITIES

Approved by *John W. Alward*
Chief Engineer

U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING

4

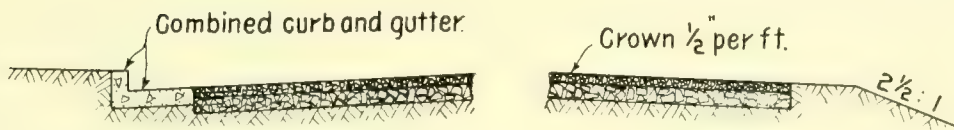
CROSS SECTION OF EARTH ROAD



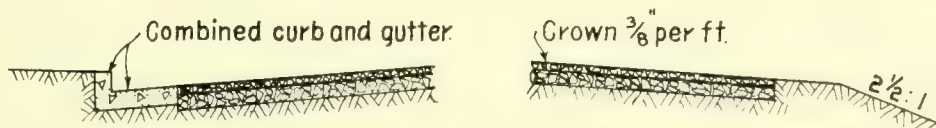
CROSS SECTION OF GRAVEL ROAD



CROSS SECTION OF WATERBOUND MACADAM ROAD



Top course $1\frac{1}{2}$ " to $2\frac{1}{2}$ " dia. broken stone or slag, 3" depth before compacting.
Bottom course 2" to $3\frac{1}{2}$ " dia. broken stone or slag, 5" depth before compacting.

CROSS SECTION OF BITUMINOUS MACADAM.
(PENETRATION METHOD)

Top course 1" to 2" dia. broken stone, 3" depth loose.

Bottom course 2" to $3\frac{1}{2}$ " dia. broken stone or slag, 5" depth loose.

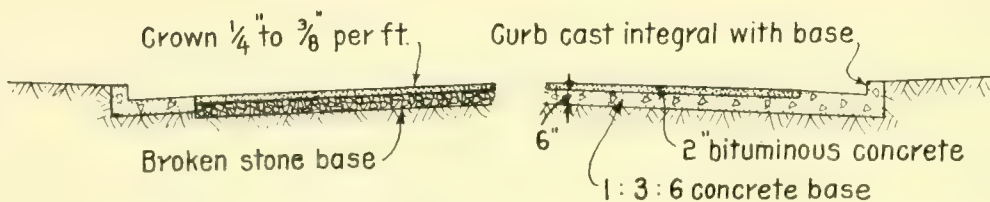
1.7 gals. bituminous material per sq. yd. 1st. coat with $\frac{5}{8}$ " to 1" dia. stone rolled in

0.6 gals. bituminous material per sq. yd. flush coat with dustless screenings rolled in.

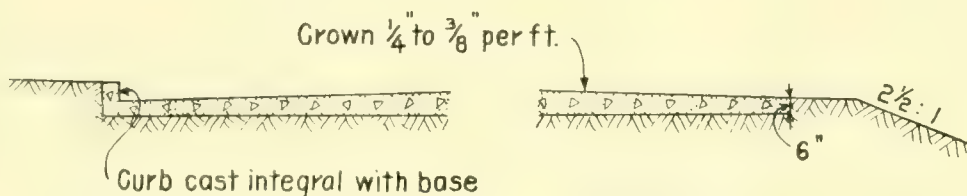
4a

U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING

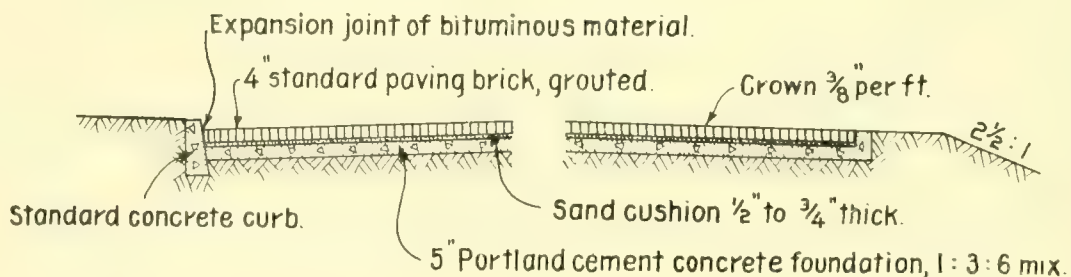
CROSS SECTION OF ASPHALTIC CONCRETE ROAD



CROSS SECTION OF CEMENT CONCRETE ROAD

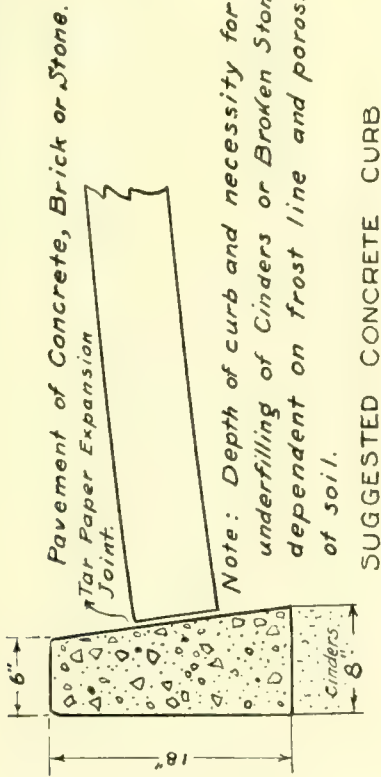


CROSS SECTION OF VITRIFIED BRICK ROAD

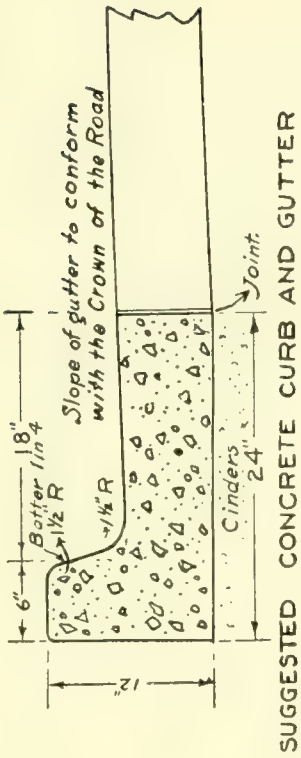


Approved by

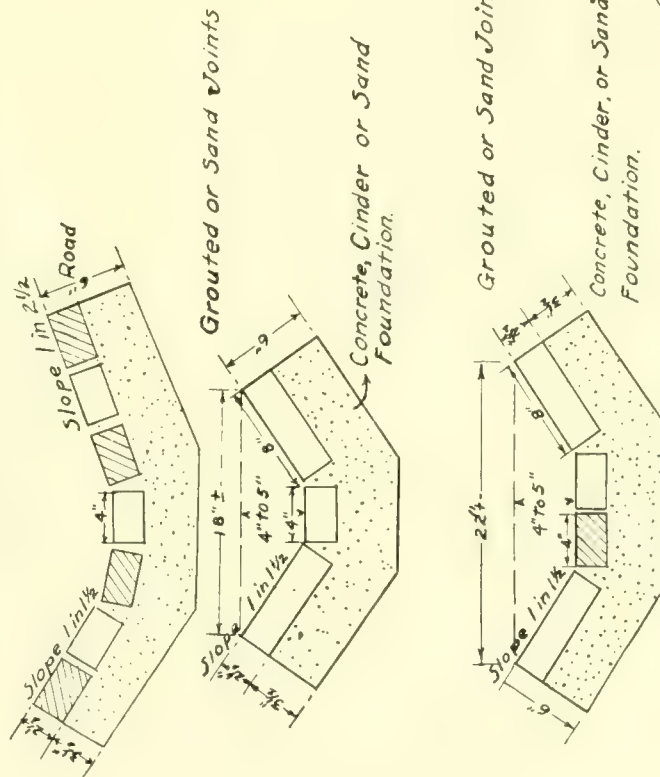
Chas. O. Chase
Chief Engineer



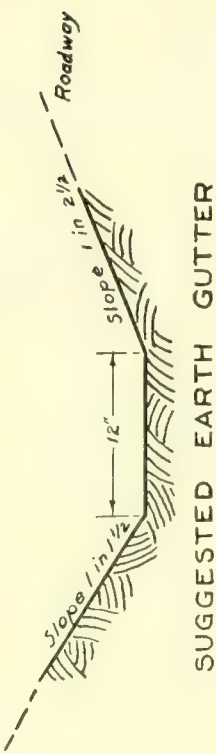
SUGGESTED CONCRETE CURB



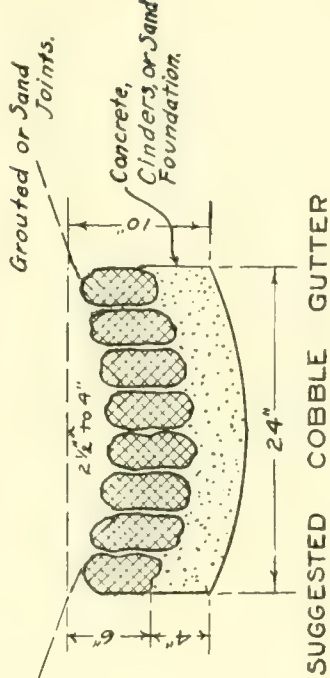
SUGGESTED CONCRETE CURB AND GUTTER



SUGGESTED BRICK GUTTERS



SUGGESTED EARTH GUTTER

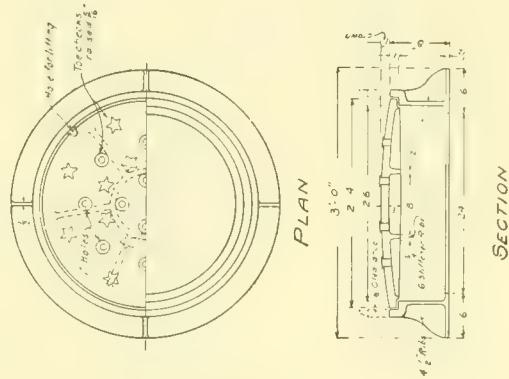


SUGGESTED COBBLE GUTTER

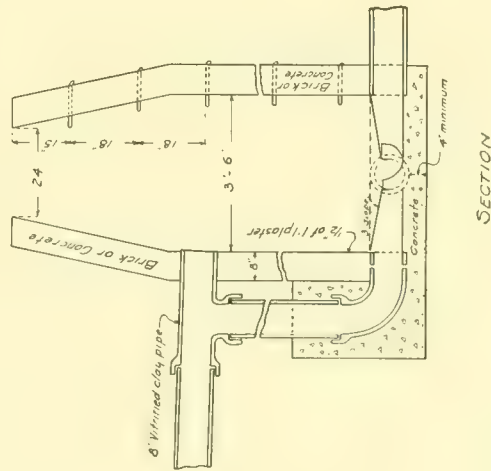
Approved *John F. Richard*
Chief Engineer
(Engineering Division)
SUGGESTED CURBS AND GUTTERS
SCALE 1" = 1'
May 29, 1918

6

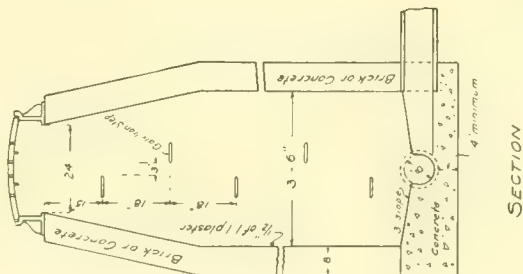
C.1 FRAME & COVER



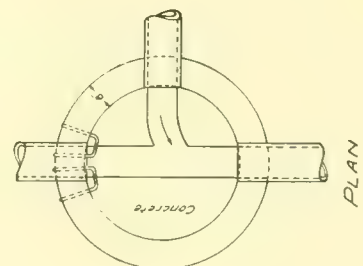
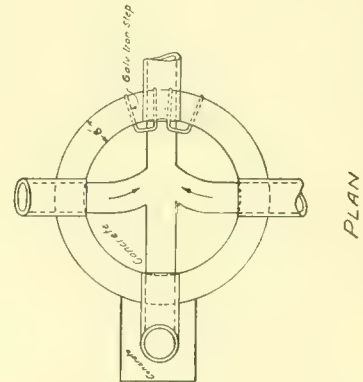
DROP MANHOLE



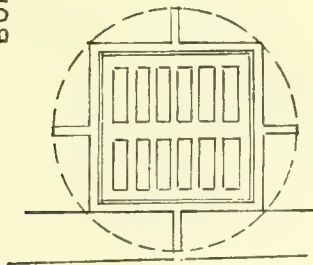
MANHOLE



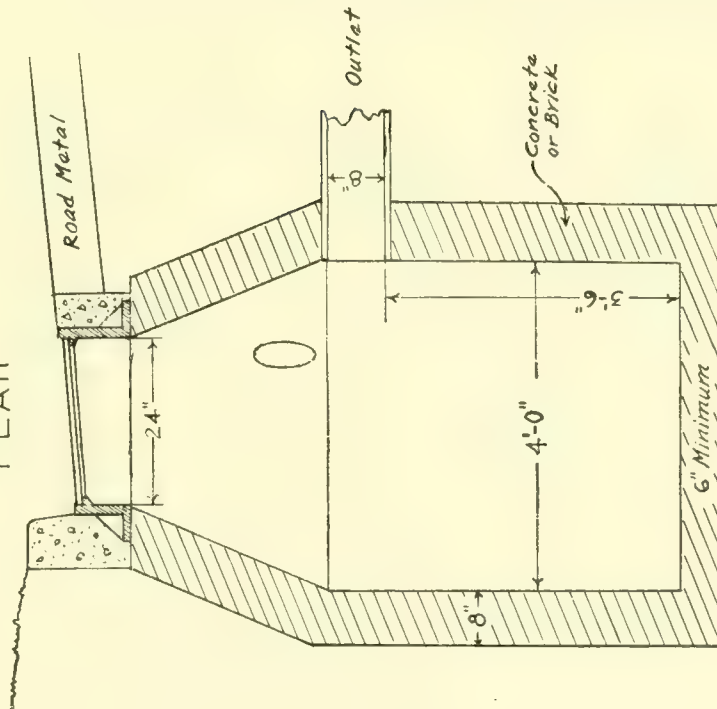
U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING & TRANSPORTATION
U.S. HOUSING CORPORATION
ENGINEERING
STANDARD MANHOLES



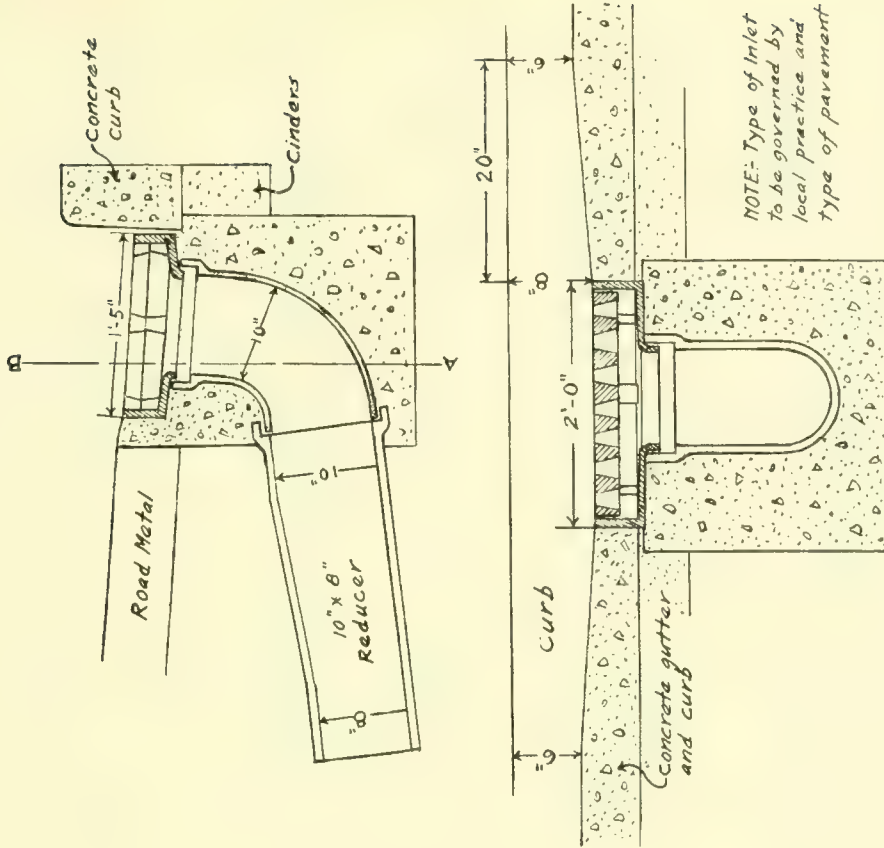
U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING



PLAN



SECTION
STANDARD CATCH-BASIN
SCALE $\frac{1}{2}'' = 1'$



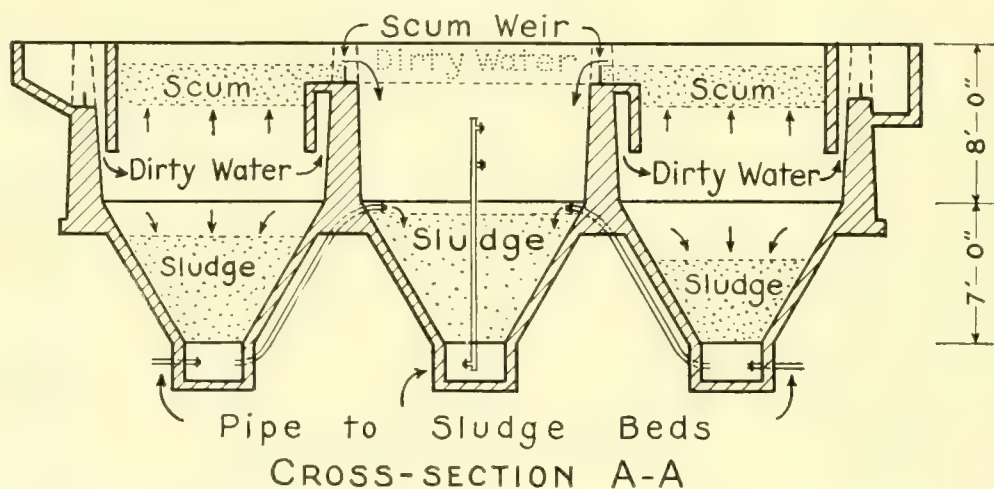
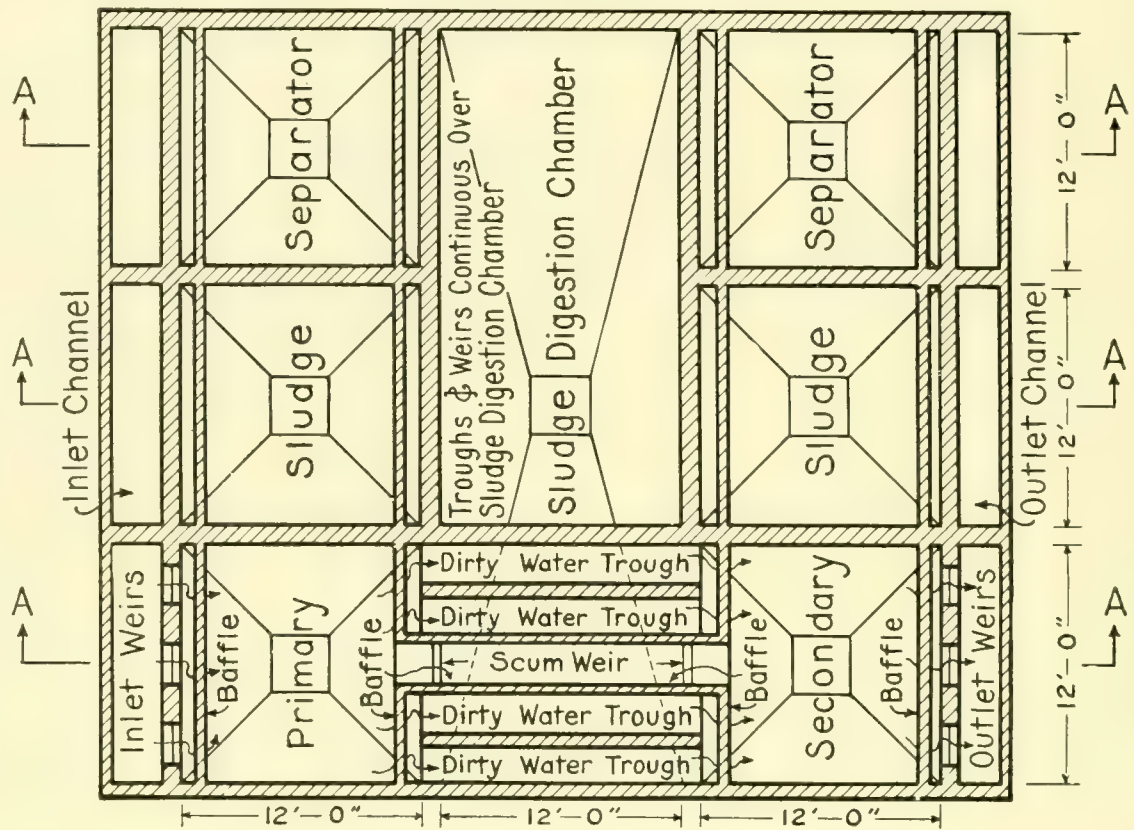
NOTE: Type of Inlet
to be governed by
local practice and
type of pavement

SECTION ON A. B.
SUGGESTED SIMPLE INLET
SCALE $\frac{3}{4}'' = 1'$

Approved: *John W. Alvord*
Chief Engineer
(Engineering Division)

U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING

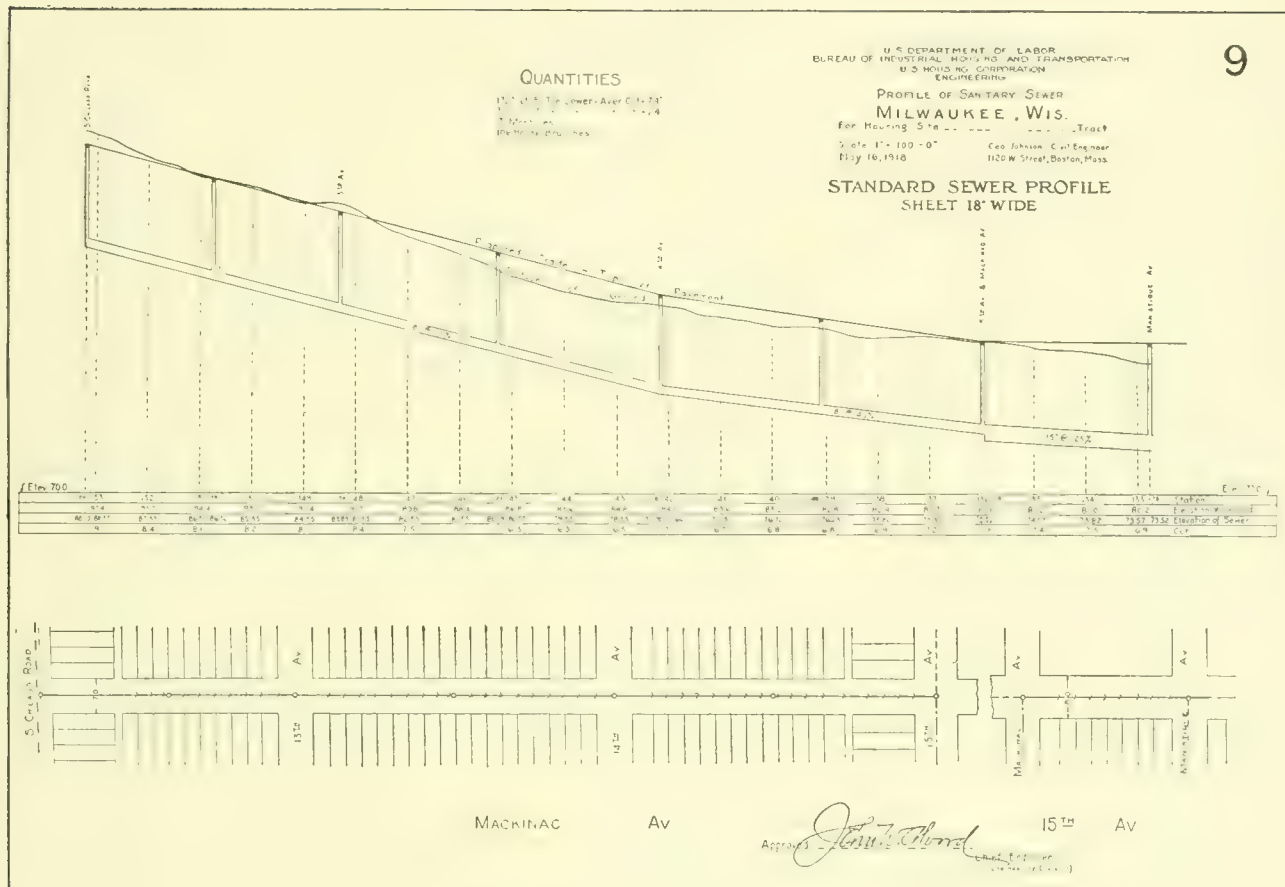
8



TYPICAL POSITIVE SEWAGE SEPARATOR AND DIGESTOR
FOR FRESH SEWAGE

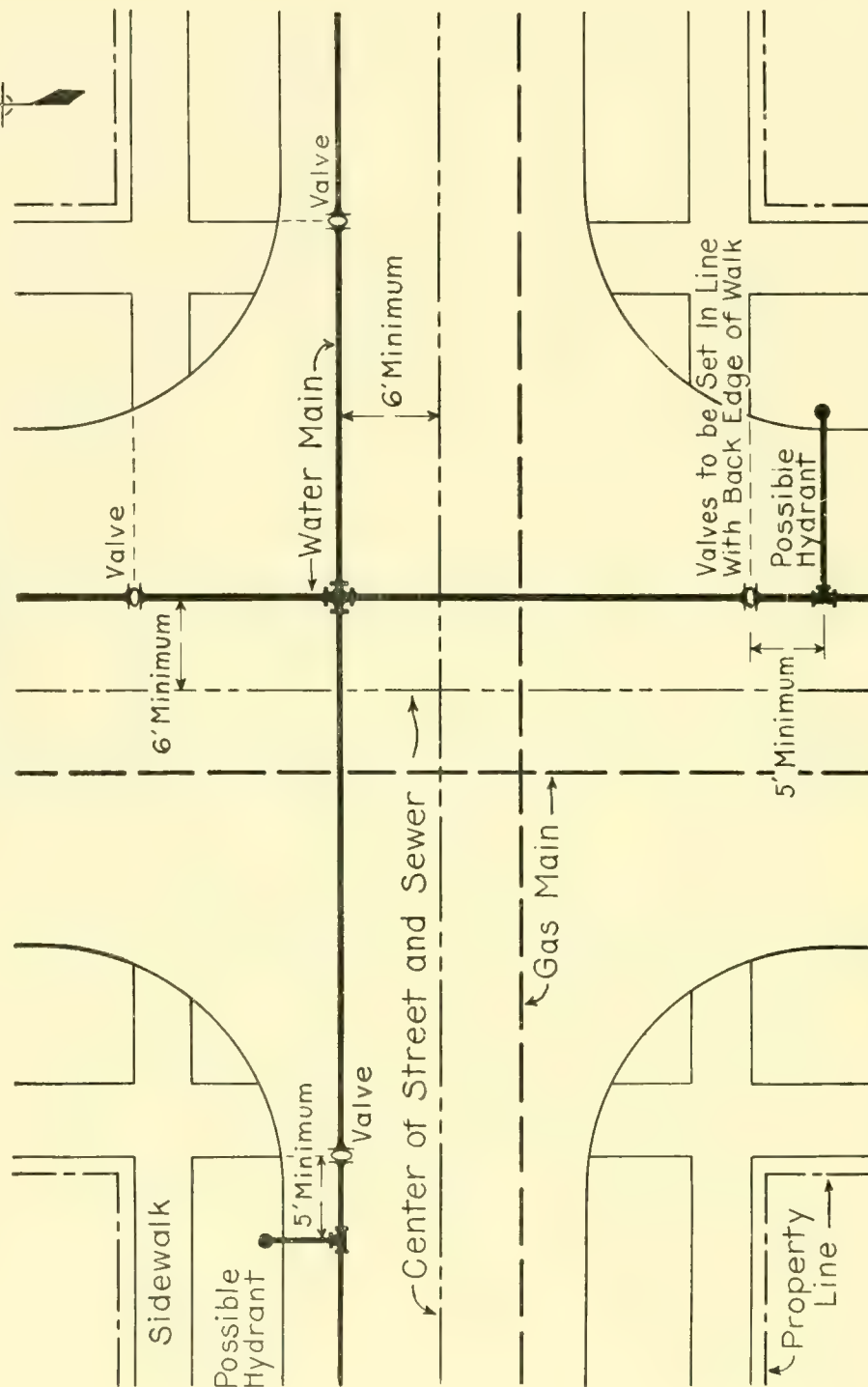
1000 HOUSE DEVELOPMENT

Following Principles Proposed by John W. Alvord - Consulting Engineer.



U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING

10

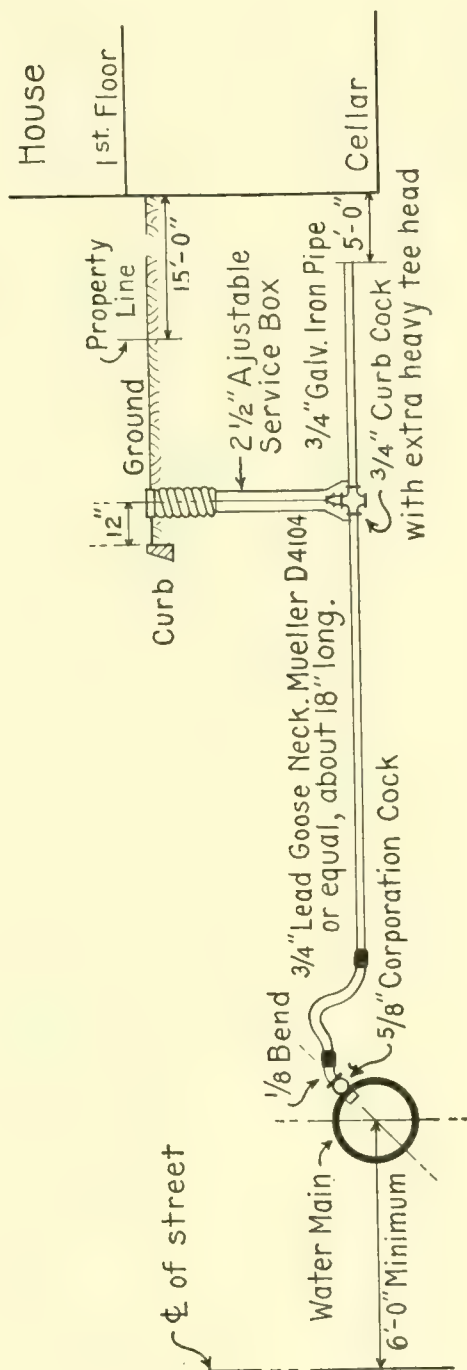


STANDARD LOCATION FOR WATER MAINS, VALVES AND HYDRANTS

Approved by John W. Chard
Chief Engineer

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U. S. HOUSING CORPORATION
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11

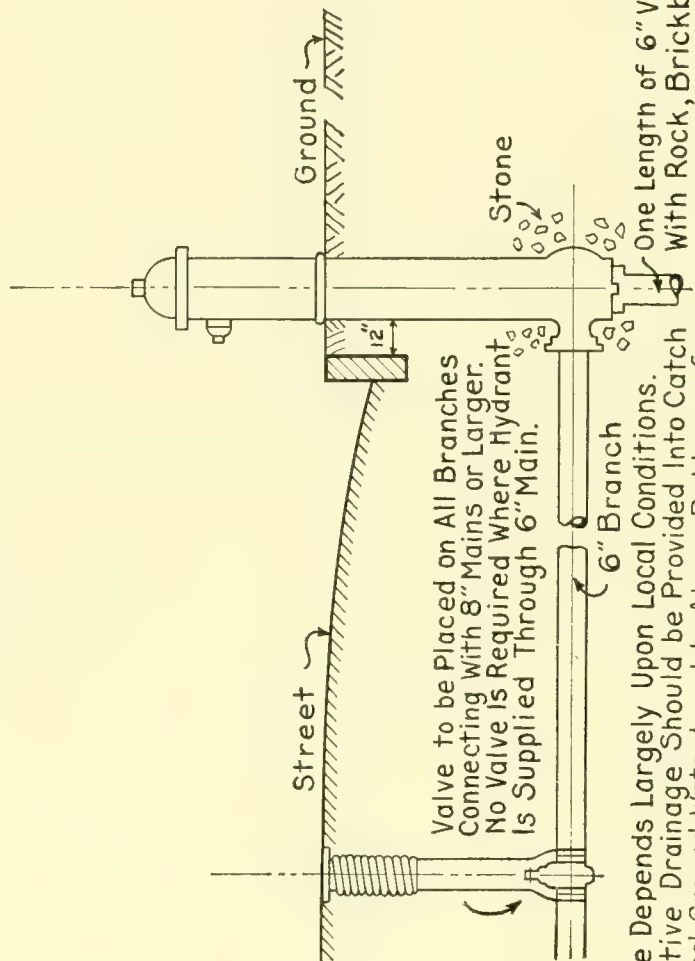


Approved *John W. Alward*
Chief Engineer

STANDARD TAP FOR HOUSE CONNECTION.

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U. S. HOUSING CORPORATION
ENGINEERING

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Valve to be Placed on All Branches Connecting with 8" Mains or Larger. No Valve Is Required Where Hydrant Is Supplied Through 6" Main.

6" Branch

One Length of 6" Vit. Pipe Filled With Rock, Brickbats, Etc.

Provision For Drainage Depends Largely Upon Local Conditions. Wherever Possible Positive Drainage Should be Provided Into Catch Basin or Sewer. If Natural Ground Water Level Is Above Bottom of Hydrant the Drip Should be Closed. The Suggested Sketch Is Made For Drainage In Clay or Loam Soil.

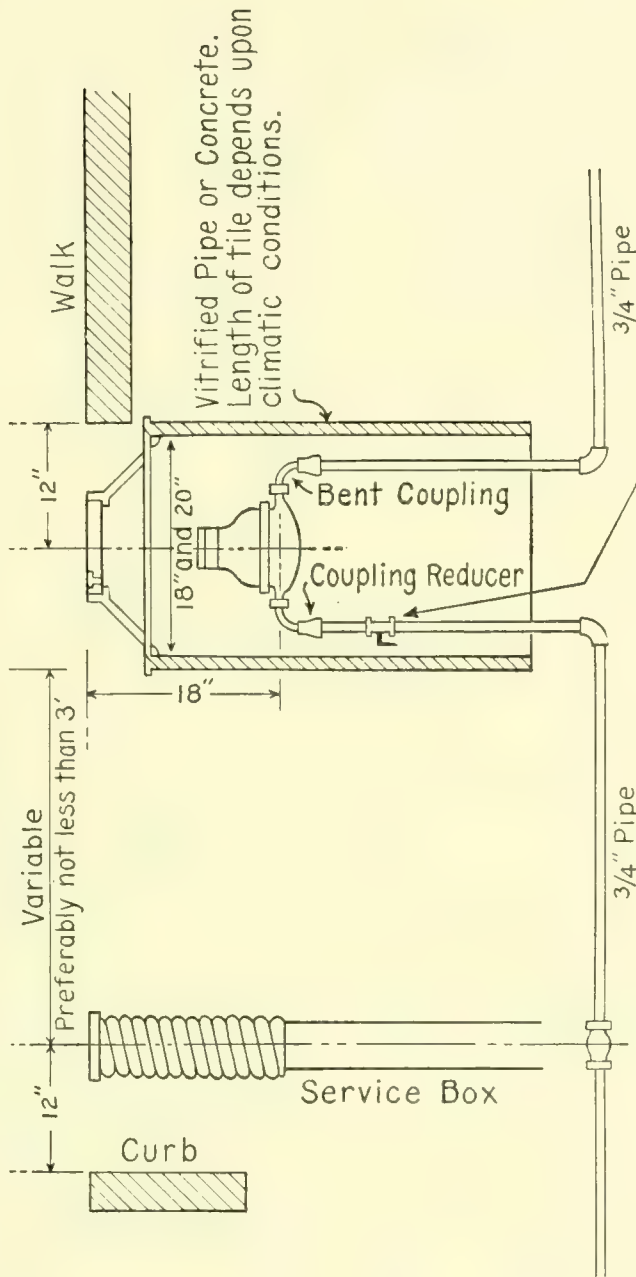
Approved by

John W. Alford
Chief Engineer

FIRE HYDRANT INSTALLATION

U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
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13



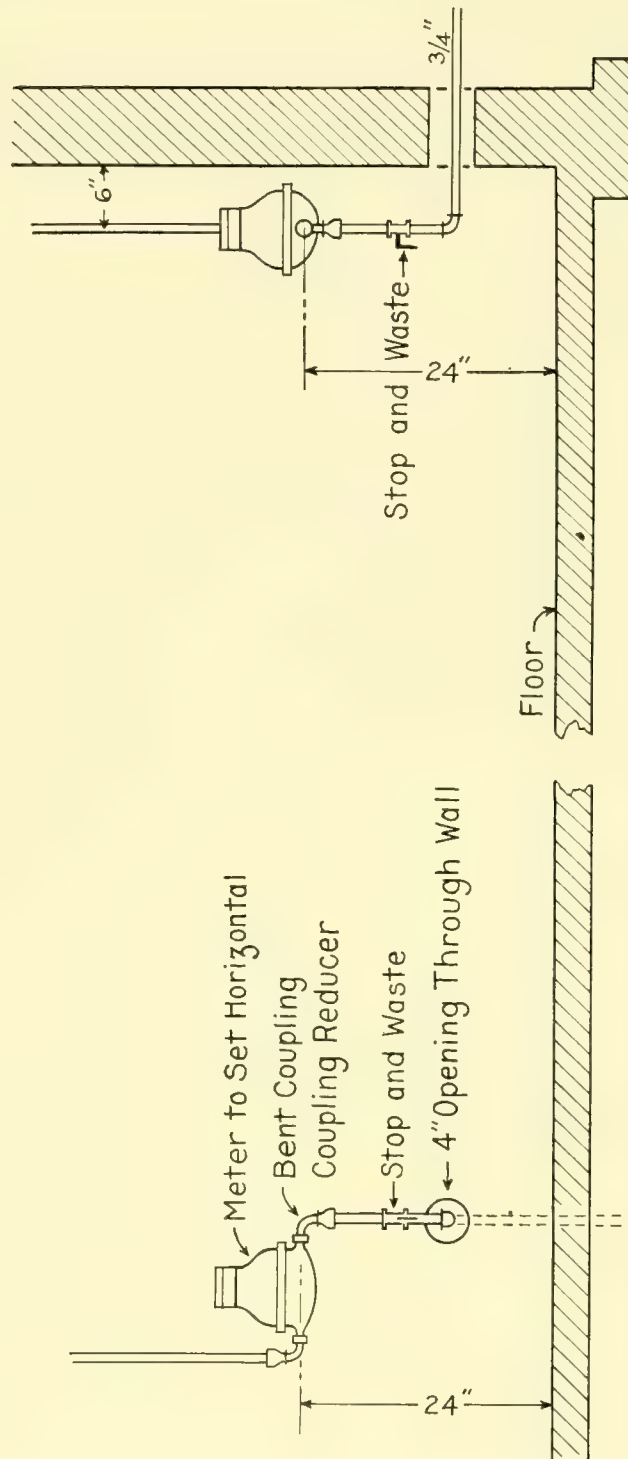
Approved

John W. Alford
Chief Engineer

LAWN METER SETTING AND HOUSING.

U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
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14



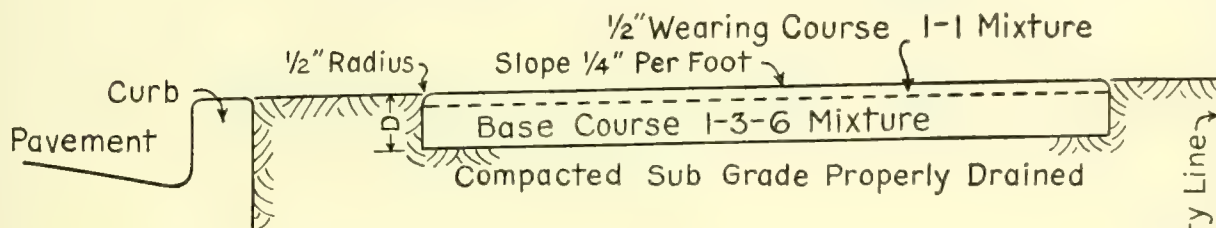
Note :- Meter not to be located in coal storage bin or where there is a possibility of storing boxes, supplies, etc., nor should it be placed near an outside window or opening where a draft of air might cause freezing during cold weather.

Approved by *John W. Richard*
Chief Engineer

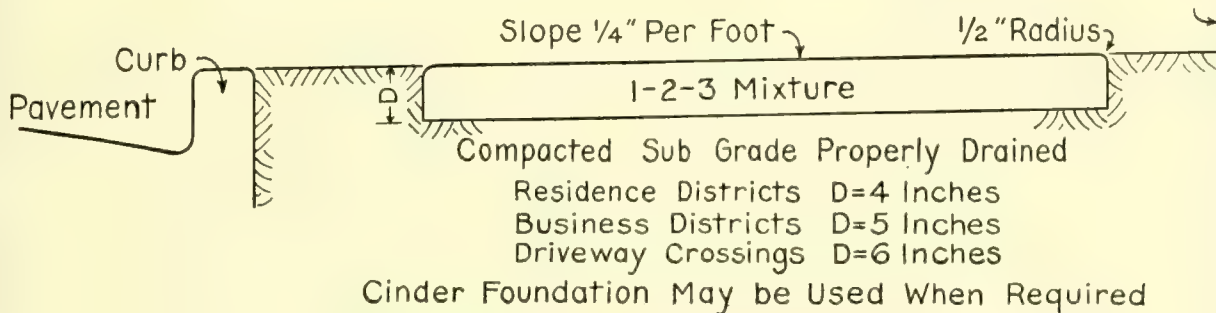
BASEMENT METER SETTING

U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION **15**
U. S. HOUSING CORPORATION
ENGINEERING

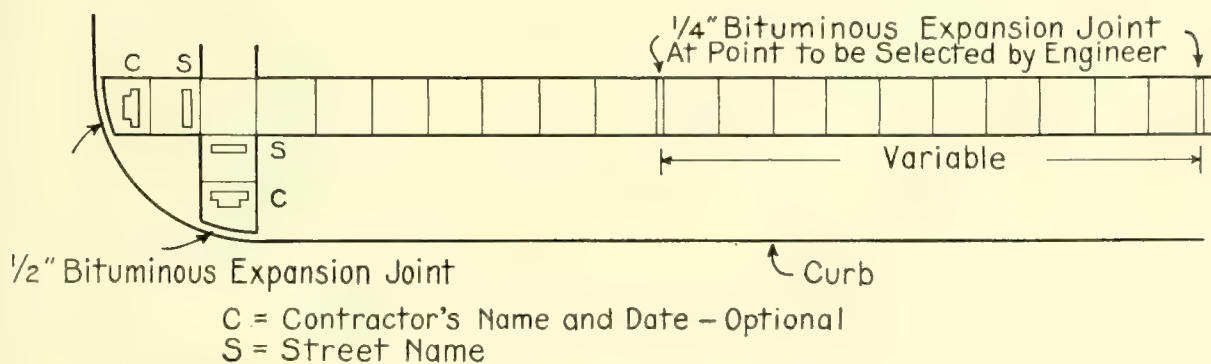
TWO COURSE CONCRETE SIDEWALK



ONE COURSE CONCRETE SIDEWALK



PLAN

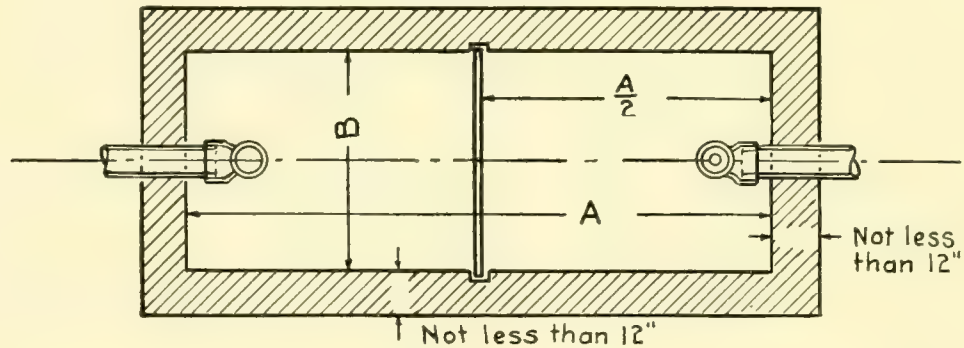


Approved by *John W. Alford*
Chief Engineer

STANDARD PLANS FOR
CONCRETE WALKS

U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING & TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING

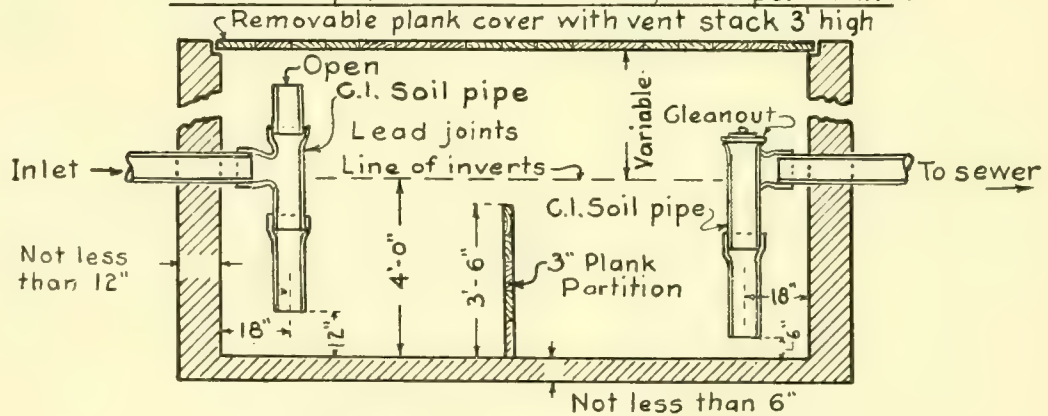
16



PLAN

Population Served	Dimensions		Total Capacity (2 Gals. per capita) Gals.
	A	B	
400	6'-8"	4'-0"	800
600	10'-0"	4'-0"	1200
800	10'-9"	5'-0"	1600
1000	13'-4"	5'-0"	2000

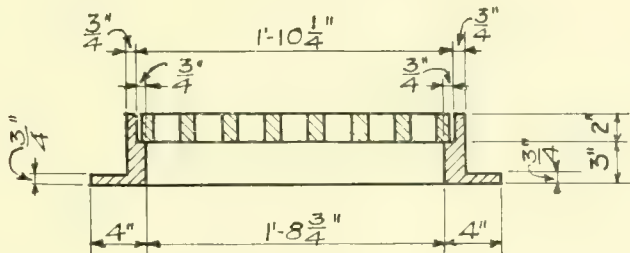
Sewage from water-closets and urinals, also surface drainage must be excluded from trap. Grease should be removed by skimming at least once per week. Sediment, once per month.

LONGITUDINAL SECTION ON C

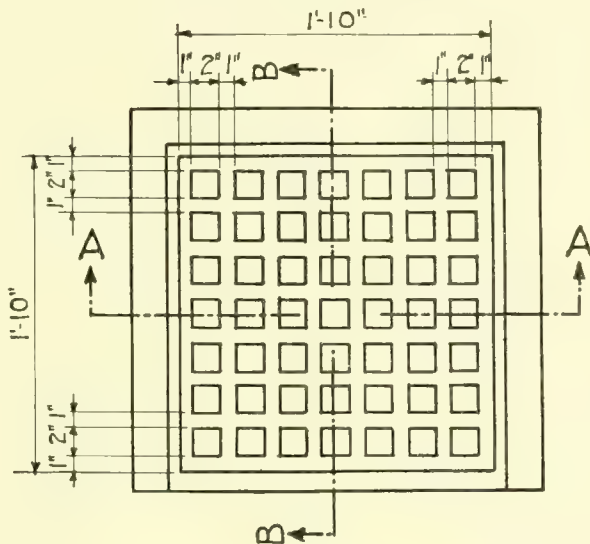
GREASE TRAP FOR KITCHEN WASTES
AS PROPOSED FOR
NEWPORT NEWS, VIRGINIA.

17

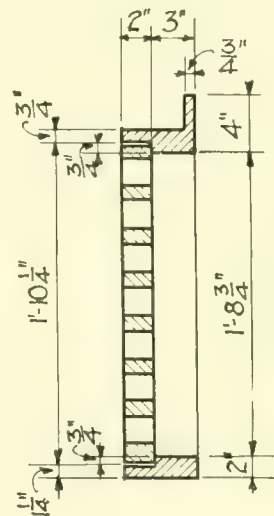
U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING



SECTION A-A



PLAN
Scale 1"=1'-0"



SECTION B-B

NOTE: Place short flange on curb side to permit curb opening if required.

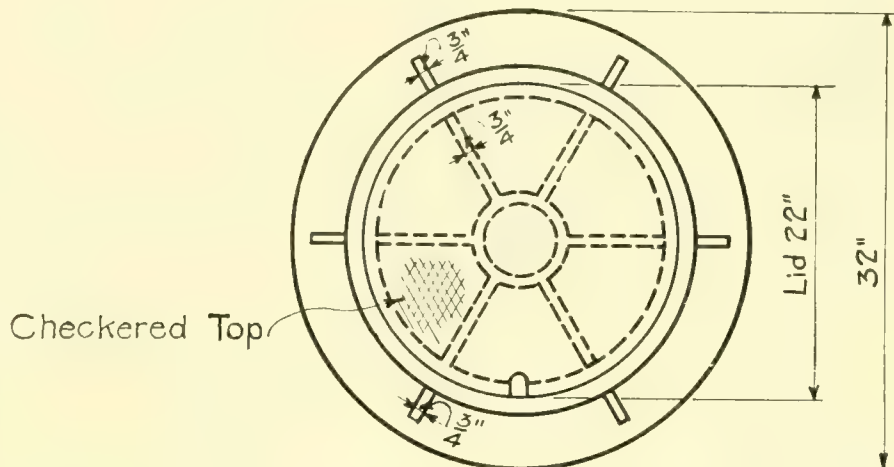
STANDARD
CATCH BASIN GRATE
AND FRAME

Approved by *John W. Chord*
Chief Engineer.

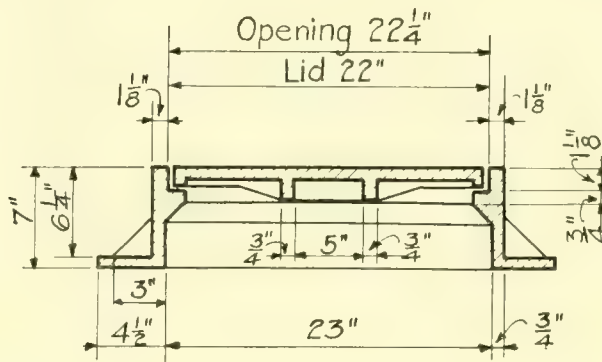
October 10, 1918.

U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U. S. HOUSING CORPORATION
ENGINEERING

18



22" Minimum Weight 300 lbs.
24" " " 350 lbs.



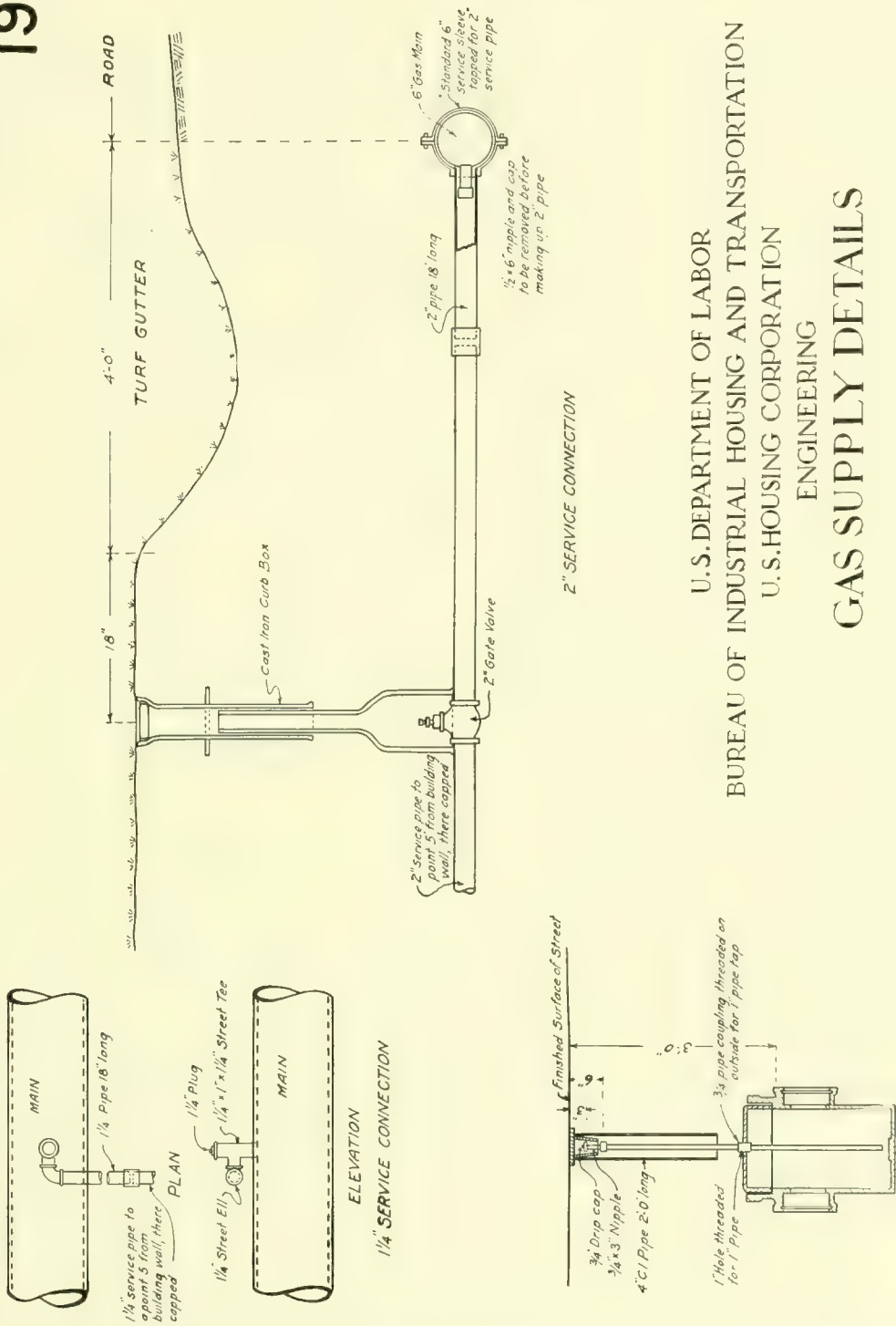
STANDARD
MANHOLE COVER
AND FRAME

Sept. 20, 1918.

NOTE: Any Cover of Approximately these Dimensions may be Used. Cover with 24" Lid and Similar Design may be Used When Required.

Approved by *John W. Alvord*
Chief Engineer

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U.S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
U.S. HOUSING CORPORATION
ENGINEERING
GAS SUPPLY DETAILS

APPENDIX VII.

POLICY TO BE ADOPTED BY THE UNITED STATES HOUSING CORPORATION OF THE DEPARTMENT OF LABOR IN ITS CONTRACT RELATIONS WITH PRIVATE UTILITY COMPANIES.

ENGINEERING DIVISION, SEPTEMBER 9, 1918.

It is necessary in almost every development for the United States Housing Corporation to enter into some form of an agreement with utility companies furnishing water, gas, electric lighting, telephone service, and possibly in some cases heating systems and natural-gas services.

In view of the large number of developments scattered from ocean to ocean, no hard and fast rule, applicable in every case, can be laid down. Still it is possible and extremely desirable that a general policy be formulated as a guide to those having charge of negotiations, in order that the contractual relations between the Housing Bureau and the utility companies may be kept simple and free from embarrassing situations for those charged with their future administration.

The conditions produced by the war render it increasingly difficult for utility companies to raise large amounts of money for needed extensions.

These companies also face the difficulty of securing material at reasonable rates or sufficient supplies of labor at any rate.

Fortunately many of the developments of the Housing Bureau are comparatively simple in their character and moderate in their demands for utility extensions. In fact, most of them can be properly compared to subdivisions commonly added to small towns and cities in normal peace times.

In certain instances, however, when these developments are located beyond the municipal limits of the adjacent city and, therefore, denied the usual contractual relations, the enterprise assumes more the character of an independent community. In such cases the relations between the Housing Bureau and the utilities found in the city are apt to assume a different form from those cases in which its development is within the municipal limits.

As a broad, general principle, it is undesirable for the United States Housing Corporation to enter into private business more than is absolutely necessary. It is indeed desirable that the corporation retain, so far as possible, its character as an employer of existing facilities in the manner in which they are commonly useful to other citizens of the community.

With this general principle in view, it may be further suggested that it would be undesirable for the Government, through its Housing Bureau, to enter into any mixed relations creating divided ownership as between the utility and the Government, or involving the Government, as part owner, in a business enterprise, particularly one over which it will have in the future little or no control.

There are three ways in which the relations between the Government and the utility may ordinarily be established. These will be described in the order of their preference:

First. The utility company may extend its services at its own cost into the territory of the housing development under the ordinances prevailing in the community in which it acts, under such standards as have been acceptable to the surrounding municipality and may bear such cost as a part of the total cost of its larger plant. Under these conditions, it may charge the rates prevalent

in the community and sanctioned by the State utility commission, and from thenceforward the Government is free from all responsibility, control, or interest in the matter, except such as may belong to any citizen of the community receiving similar service.

Second. In the event of the inability of the utility company to provide the distribution system or service, or both, due to difficulty in financing its extensions, the Housing Bureau, after satisfying itself that the utility company is reasonably entitled to aid and assistance, may make it such loan or advance as in its opinion will enable the utility company to operate the necessary service by extending its distribution system throughout the development. Under such circumstances, it is desirable that the loan from the Housing Bureau be properly secured in the same manner as any financial transaction should be similarly secured, and that it be repaid in reasonable time, either through partial payments or sinking fund, or an annual payment of a certain reasonable proportion of the revenue it collects from the housing district. In this case the rates for service should still be those generally paid by the adjacent municipality in which the service is being sold, or in the case of an independent development outside of the existing municipality, through special contract, which shall afford rates similar to those of the adjacent municipality, but in all special cases the revenue should be equal and sufficient to produce a fair return upon the invested capital, after allowing for operation, maintenance, repairs, and depreciation.

Third. In certain cases where the existing utility is either unable or unwilling to extend its service into the development of the Housing Bureau, and where such service is necessary to the comfort and convenience of the inhabitants of the housing district, it may be desirable, as a last resort, for the Housing Bureau itself to build, own, and control the necessary distribution system, but not to operate or maintain the same. Such operation and maintenance and the necessary service received through meter or other method of measurement should be the subject of a contract, the preferred method being to lease the Government-owned distribution system to the utility company, or, failing in this, to have the utility company operate and maintain it, collect the revenues therefrom, and return to the Government so much of the revenues as are needed for interest and depreciation or fair return upon the capital so invested in the distribution system.

It is desirable in this latter case that the contract shall provide that as soon after the war as practicable provision shall be made for the acquisition of the distribution system and its appurtenances by the public utility company. The valuation shall be determined either by original cost or reproduction value at the date of transfer. If possible, it would be well to provide for sinking funds for this purpose during a term of years.

It is obvious that the three methods outlined above are desirable from the standpoint of the Government about in the order in which they have been described, and that the third and last method described being the least desirable method, is to be

avoided, if possible. It is to be particularly noted that any deviation from these three methods is, at best, far less desirable than any one of them. For instance:

Any method is objectionable by which the Government jointly owns the whole distribution system or entirely owns a part thereof, or loans money to the utility in such way as to become involved in the hazards of the business or enters into relations which are so complex and so subject to the vicissitudes of the future that they may result in embarrassing situations, difficulties, or litigation.

Therefore, it should be the policy of the bureau to avoid all partial ownership, all contribution of material or labor or supplies in such a way that it is not clearly understood whether or not the distribution system and its accessories are to be owned as a whole by the utility company.

This does not mean that the Government may not at its option utilize its ability to cheaply purchase materials at this time for and in behalf of the utility company and to give this service to them subject to prompt repayment, acting thus only as agent for the utility in purchasing materials on priority rights. Nor does it mean that the Government should not and will not utilize all its efforts in the way of transportation, allotment of labor, or other means at its disposal to aid the utility company in its efforts to extend its service into the housing development. But it does mean that the Government should not purchase materials which are installed in the public streets in such a manner as to pass out of its control or to create a joint interest in a distribution system, or as to involve the Government in complex relations which may allow the property to pass to other ownership by neglect.

In extreme cases in entering into contracts with utilities for service, and particularly in those cases where the Government loans secured funds for such extensions, it may be permissible to write off what are known as war costs, that is to say, excessive costs due to the high prices of materials temporarily created by the war. There are two ways of accomplishing this where it becomes necessary:

First. The simple and most direct way is of deciding at the present time on an approximate estimate of the excess war costs and stating this in simple terms of percentage of the present cost to the utility company.

Second. By providing that at a reasonable period after the war there shall be an appraisal and that the cost of reproduction at that time shall be found and considered in arriving at the then value as against the present excessive war cost.

Reviewing these two methods, it is obvious that it is fairer to all concerned to have the arbitration clause included in the contract, as being a frank admission by the Government that the present crisis has created the necessity for emergency expendi-

tures and that the Government should pay as a war emergency cost the difference if any between the present cost and the future value.

In many cases, however, it will probably be found that loans to the utilities are relatively so small that the cost of appraisals would hardly be warranted.

Under these conditions it may or may not be best to resort to the first method described and at the present time frankly come to some simple agreement which represents the belief of both parties at interest as to what the excess war costs will be.

The question of interest on money loaned to public utilities is one to be taken up and decided in each individual case. In most cases it should be the rate of interest during normal or peace times, thus relieving the Government from any excess charge on account of war costs. In certain individual cases it may be desirable and necessary if possible to forego interest or its equivalent as a part consideration of the loan or at least forego interest or its equivalent during the period of the war or for some fixed and specific time.

In all cases where the Government buys material for the private utility at its special war prices on priority orders, it should be done in such a manner that the bureau may be assured that the utility company has properly and legally authorized the Government to become its purchasing agent and is committed to the return of the money either on delivery of the goods or 30 days thereafter or through the agency of the loan or advance made in each specific case.

RATES FOR SERVICE.

Rates for service will, as a rule, be governed by the contractual relations of the utility company with the municipality which it serves and in or near which the development may be situated or by the public service commission of the State in which the same is located. In case there is failure of any or all of these methods of determining fair and proper rates, the Housing Bureau shall, through its utility engineer, make such investigations as to the invested capital, present and future operating expenses, maintenance, repair, depreciation, and fair return of the utility in question as shall enable him to assure the Government that the proposed rates are fair to the future tenants of the housing development.

AUTHORITY.

Contracts, agreements, loans, and all contract relations with private utility companies shall only be entered into by authority of the Legal Division of the Housing Bureau, subject to the approval of the director, the Legal Division being assisted by such technical aid, advice, and help as can be rendered by the Engineering Division or such of its engineers who are specially qualified for this particular purpose.



APPENDIX VIII.

PREPARATION OF RECORDS AND PLANS TO ACCOMPANY THE TRANSFER OR DEDICATION OF HIGHWAYS AND UTILITIES TO THE MUNICIPALITY.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, UNITED STATES HOUSING CORPORATION, ENGINEERING DIVISION, NOVEMBER 13, 1918.

1. *Explanatory.*—When a housing development is within the corporate limits of a municipality it is generally desirable that the title to streets or highways be transferred to such municipality, dedicated as public thoroughfares and subject to control, maintenance, and responsibility of the municipal officials. Likewise it is generally desirable that title to certain public utilities, such as water mains, sewers, and pavements owned by the United States Housing Corporation, be transferred to the municipality for the purpose of maintenance and harmonious operation.

2. *Dedication procedure.*—In the event that the United States Housing Corporation, proposes to dedicate highways and utilities to the municipality it is essential first to ascertain from the local attorney of the United States Housing Corporation or from the municipal attorney or engineer the procedure and requirements for public dedications and acceptance. Local ordinances or by-laws generally govern this procedure. As a rule the following data will be required from the project engineer:

3. *Subdivision plat.*—This is required as a record in the municipal or county recorder's office for the purpose of making sales, leases, or transfers of individual lots by the United States Housing Corporation as well as for purposes of taxation. It is required in addition to any purpose it may serve as a document for the dedication of public thoroughfares. This plat should contain the following information: (a) A correct boundary survey with a description sufficient to convey title. If the entire area or tract controlled by the United States Housing Corporation is not to be dedicated at this time, clearly indicate the limits of dedicated portion. (b) Definite location of all street, lot, and block lines. (c) Numbers and dimensions of all lots and blocks. (d) Boundary monuments and survey references. (e) Affidavit of the surveyor. (f) Approval signature of the chief engineer, United States Housing Corporation.

4. *Street dedication map.*—This plat may be required as a separate document to be submitted to the municipality in addition to the subdivision plat, depending on local practice. The requirements are essentially the same as for the subdivision plat and generally the same print may be used.

5. *Street profiles or grades.*—This information should be given to the city engineer in any event. It is desirable and often required in dedication procedure that a typewritten report of recommended or established street and sidewalk grades be prepared which may be used as the basis of an ordinance to formally establish such grades.

6. *Sewers.*—For the purpose of transferring the title of sewers to a municipality the project engineer should furnish the following: (a) A plan showing exact location and size of sewers and manholes as constructed, with elevations in figures of sewer invert at each manhole and elevation of manhole covers. Location of house connections should be shown; (b) profiles of sewers; (c) a written description giving size, alignment, grade, and location of Y's may be required in addition by some municipalities.

7. *Water mains.*—The project engineer should furnish to the city engineer, giving exact location as constructed of all water mains, hydrants, valves, service pipes, sprinkler connections, hose stations, and fire-alarm boxes, etc., even though no transfer of property to the municipality is involved.

8. *Special utilities.*—Such as pumping stations, sewage-treating plants, etc., if dedicated, may be done with the same plats or documents provided for the water or sewerage system of which they are a part.

9. *Instructions for operation of utilities.*—Furnish the municipality and operating division of the United States Housing Corporation blue print charts or keys and concise and explicit rules for operation of special utilities. This is particularly required for sewage-disposal plants.

10. *Utility companies.*—The contracts of the United States Housing Corporation with private utility companies, such as electric, gas, or water companies, and dedication procedure should conform and be made subject to the franchise from the municipality under which the utility companies operate. Arrangements should be made whereby the municipality shall assume all customary rental costs of electric or gas street lights; likewise, in the case of private water companies, arrangements should be made with the municipality to reimburse the water company for fire-hydrant rentals.

11. *Easements and utility rights of way.*—An easement or right-of-way agreement may be necessary between the United States Housing Corporation and the utility company in those developments where public alleys have not been laid out and where electric lines or other utilities are located on private property through or on the rear of lots. This, like all similar documents, will be made or be subject to the approval of the legal department of the United States Housing Corporation. The project engineer, however, will furnish any necessary plat.

12. *Fire-alarm service.*—This service is almost invariably furnished by the municipality out of general taxes. The requirements for fire alarms in any United States Housing Corporations development should be presented to the municipal department and credit obtained therefor.

13. *Parks.*—If it is desired, any land held by the United States Housing Corporation may be dedicated to the public for park purposes, through the local park commissioner, or authorized municipal authorities in order to provide for the proper maintenance at public cost, as well as to relieve the United States Housing Corporation from taxes on the land. The project engineer should provide the land plats and descriptions necessary for the transfer of such property.

14. *In general.*—Furnish copies of all above data of surveys and utilities as constructed in copies sufficient to inform (1) the municipality, (2) the Chief Engineer, (3) the Real Estate Division, (4) the Operating Division of the United States Housing Corporation.

Do not spend time in making special drawings or surveys when existing tracing or blue prints not required for contract records may be modified, added to, and made use of.

When new drawings are required they should conform without additional work to any existing standards or sizes in the city engineer's office.

A typical cross section of streets, showing street lines, walks, curbs, water, gas, sewer, etc., is desirable for filing with city engineer in addition to the plans and profiles.

15. *Monuments.*—It is desirable that project engineers place permanent boundary monuments at governing points in the housing project.

It is suggested that these monuments be located on the street-property line, preferably one at the northwest corner of certain

street intersections and on boundary corners of the United States Housing Corporation property.

These monuments may be: (a) Stone about 4 by 4 inches set in concrete base; (b) concrete post, with iron center about 5 by 5 inches square or 5 inches diameter; (c) an iron pin or pipe three-fourth-inch diameter and not less than 36 inches long.

Top of monuments at elevation of sidewalk grade. Base of stone or concrete monuments 4 feet deep.

Each project engineer shall write a brief report of the history and progress of the development, directed to the chief engineer, with particular attention to difficulties encountered and overcome or any underground features of future use.

NOTE.—Unit costs if readily available and clearly representative would be instructive and of general interest.

APPENDIX IX.

SUGGESTIONS TO TOWN PLANNERS.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, UNITED STATES HOUSING CORPORATION, TOWN PLANNING DIVISION, AUGUST, 26, 1918.

NOTE.—Many of the preliminary points suggested herein will have been already considered by the investigators and the staff of the United States Housing Corporation (see Instructions to Investigators). Records of this consideration are available to the designers, usually in digested and tabulated form, but in most cases this consideration has been carried only far enough to determine tentatively the choice of site, the general type of development, and the amount of appropriation.

It is the duty of the designers to inform themselves further, wherever necessary, by investigation on the ground, on all matters bearing on the design, and to report the fact to the corporation at once if in any important respect the designers' conclusions, in the light of their more detailed information, differ from those of the corporation.

Maps of the property.—As a basis for town planning design the following maps will be necessary:

A. For the making of a contract for the acquisition of the property by the corporation, it will be necessary to have maps showing the boundaries of the land, and its relation to surrounding property and streets, with sufficient accuracy to identify the property.

B. For final acquisition there must be maps showing the outside boundaries of the property with accurate dimensions and angles or bearings, the total area, proper description of the bound stones or other landmarks, and designation of the abutting properties. (See Instructions to Surveyors for the Preparation of Boundary Surveys.)

C. For design in general layout and for construction work, topographic maps will be necessary. (See Instructions to Surveyors for the Preparation of Topographic Maps.)

"A" will sometimes be procured by the investigating committee before the designers begin their work. "B" and "C," and "A" if not already provided, are to be furnished by a surveyor reporting to the engineer or to the town planner, as the corporation may direct. The degree of detail, etc., will be determined by the engineer or the town planner, as the case may be, under the direction of the corporation. It is essential that these maps be begun at the earliest possible moment, and pushed with the greatest speed consistent with sufficient accuracy.

Type or types of development.—These will depend on the type of labor which must be housed in order to provide a balanced working force where now there is a labor shortage. They will depend on (1) the wages earned by each group of workers, (2) their nationality, race, and customs, (3) the local customs as to building, what kind of construction is cheapest locally to construct and maintain, what the local contractors are used to doing, and especially what kinds of houses and lots the local market will absorb, particularly what kinds will be salable after the war without producing bad living conditions. (See also Districting, later.)

Completeness of development.—The people housed must be able in some way to obtain all the necessary facilities for effective self-

respecting living and work. In so far as these facilities are already provided by the community in which the new housing is being placed, and are sufficient in kind and amount and accessible from the new housing, these facilities should be accepted and the design related to them as far as may be necessary. If some of these facilities are lacking, steps must be taken to assure their provision, so that when the houses are ready for occupancy, the schools, playgrounds, amusements, stores, etc., shall also be ready in reasonably sufficient amount and reasonably accessible. How far these are to be provided by the city or other local body, how far they are to be provided by the United States Housing Corporation, and how far, if provided by the latter, their cost is to be apportioned as a capital charge against the houses and lots, so raising the purchase price or the rental required to meet the cost of each dwelling, will be ascertained or determined in each case by the corporation.

Cost of development.—The total cost of the development is fixed by the appropriation made by the corporation. Fifteen per cent of this appropriation is set aside by the corporation to cover designers' fees and expenses, bureau overhead, and contingencies. The number of houses is roughly determined at the same time, in the light of the corporation's decision as to what types of people are to be housed, and the knowledge of the corporation as to the cost of houses of the appropriate types.

The devising of a kind of development of land, utilities, and buildings, such that the people shall be properly accommodated at the least possible total cost per family, is the task of the committee of designers.

Test estimate of cost, based on preliminary plans.—Costs of land and development per family housed may be divided into the following classes: (1) Those costs which depend on total size of lot, e. g., cost of land, of clearing the ground, etc.; (2) costs of those facilities which, while provided only in certain locations in the development, are for the general benefit and so should be assessed in some equitable way upon every family, e. g., cost of playgrounds, sewage treatment works, water main leading to the whole development, sewage or water pumps, etc.; (3) those costs which vary largely with the total length of streets or the frontage of lots, e. g., cost of land devoted to streets, cost of water mains, sewers, and gas pipes in streets, street paving, sidewalks, etc.; (4) those costs which vary with the number of lots, and depend on the size, shape, and arrangement of the house and lot, e. g., houses, water, sewer and gas connections to houses, walks to front and back of houses, side-line fences, lot planting, etc.

It is plain that the worth of a general-layout plan can be determined intelligently only in the light of some estimate of cost.

It is suggested that, in estimating preliminary sketches of general layout, the various items of cost be figured with such accuracy as is at the time possible and advisable, grouped in the following classes: (1) Items calculated per acre of land in lots, in streets, etc. (2) Items calculated as separate units, chargeable to the whole

development. (3) Items calculated per linear foot of streets (counting each intersection only once). (4) Items calculated per house lot (indicating assumed normal lot sizes).

In case of semidetached houses each half of the double house and double lot is reckoned as one house and lot, and similarly for row houses.

When this has been done, the quantities on a preliminary plan need to be estimated only to the extent of showing the total area of land, the length on center-line of streets of each kind, and the number of house lots of each kind. With the above data it is possible roughly to figure the total cost of the proposed scheme.

Such rough estimates of alternative studies should be preserved, for comparison in discussion with the scheme recommended by the designers. For the recommended scheme, the estimates should be itemized according to the General Instructions to Committee of Designers. (See p. 445).

Reduction of costs.—The designs should be such as to cut the costs to the minimum consistent with reasonable satisfaction to the occupants and reasonable economy in use and upkeep. There are limits of size and quality in each case, both in the houses and in the lots and utilities, below which it is not economical to go. On the other hand, any work which can be postponed until after the war without too great loss in present efficiency should be omitted or postponed, e. g., expensive fences, garages, complete improvement of park areas (though park areas should be set apart at once). Often cheaper road surfaces can be used temporarily; curbs or paved gutters or both may be postponed; sidewalks on minor streets and house walks may be made of gravel or cinders instead of concrete, etc. Street planting, and where possible park planting, should be part of the immediate development. Planting on private lots should generally be minimized or postponed except for planting which entails a small initial cost and depends upon time for its effect, i. e., trees, good vines on the houses, and hedges where their use permits a net saving by the omission of otherwise necessary fences.

Relation to plan of surrounding area.—The street system, the size and shape of blocks and lots, the types of development, should be studied in relation to conditions, existing and proposed, of the community in or near which the development is constructed. Especially any officially accepted city plan is to be taken into account.

Districing.—Differentiation of various areas according to their functions is important to fit the blocks and lots in each area to their use, to tend to stabilize the use of land, to allow an organized system of thoroughfares, and to present an orderly appearance through reasonable design.

Convertibility of houses and lots.—Where permanent houses are proposed, the districts for such houses should be designed to remain in the same type of use for the probable life of the houses, at least.

When convertible houses are proposed, the districing should provide for the ultimate use of the dwellings, even at some diminution of fitness for their present temporary use.

When temporary houses are proposed, care should be taken that their lower type does not react too unfavorably on the development of the neighboring land, and that they do not tend to become in effect permanent, perhaps under a still lower type of use.

The general arrangement of the development itself, the roads, the public buildings, the relation to the general city plan, should be planned for reasonable permanence even though the uses of some of the property may change.

LOTS AND BLOCKS.

Residential lots.—Determine the minimum width¹ of lot from the width of the house of the type in question plus the necessary width of side yards for light, air, and access to the back.

A two-story single or semidetached house, or the end house of a row, should have at least 16 feet clearance between it and the house beside it. A 20-foot clearance should be provided when possible, and between the ends of rows a clearance of at least 25 feet is highly desirable, as a matter of appearance as well as of air and light.

Determine the maximum width of lot by the possible expenditure for land and especially for all charges varying with the street frontage of the lots indicated on plans, e. g., pavement, gutters, sidewalks, and underground utility mains.

Determine the minimum depth of lot by adding the desirable setback between the house and the front lot line, the depth of the house, and the required depth of back yard. Five feet is about a minimum setback from lot line to porch, even in very densely built developments; 10 feet is better; 15 feet is not too much when it can be afforded. In any event, the space between house fronts should be at least 60 feet² and between the rears of houses at least 50 feet. Where a garage is allowed in the back yard it must be 15 feet from the house, and therefore 35 feet is about the minimum distance from house to back lot line, and 40 to 50 feet is preferable. When a garden is to be provided this dimension will normally be increased.

The maximum depth of lots is controlled either by land cost or by the improbability that a large garden space will be efficiently utilized. A total lot depth of more than 130 feet is seldom likely to be efficiently used in an industrial community.

A density of less than six or seven families per gross acre, including streets but excluding parks and playfields, even in single-family houses, is seldom economical or necessary for proper living. By the use of semidetached one-family houses or (usually less desirable) detached two-family houses (two-flatters) the density may normally be increased to about 12 families to the gross acre. High land values may in special cases require a higher density of families per gross acre, obtained by the use of row houses, semidetached two-family houses (four flats under one roof), or even rows of two-family houses and apartments.

Residential blocks.—The normal block width being twice the normal lot depth (in some cases plus an alley or other interior development), irregular blocks which are much greater in width than this are uneconomical unless some special use is found for the land in the interior, or unless there is a saving in construction cost which more than offsets the waste of land. Blocks or portions of blocks having a width of less than two normal lot depths, especially narrow pointed block ends, are still more uneconomical, because costly street construction as well as land area is thus inefficiently used.

The normal block length is determined by traffic and topographic considerations. Six hundred feet is a reasonable average.

Any block over 800 feet long is likely to be inconvenient, but in local residential neighborhoods, where topography makes adherence to this rule difficult, such as on steep hillsides, a footpath through the block may serve the cross traffic well enough, thus allowing the block under exceptional circumstances to become 1,200 feet long. Blocks should not normally be less than 400 feet in length.

Aspect and orientation of blocks should, so far as possible, be such that both front and back of the houses shall receive some sunlight, and that the summer fair-weather breeze shall blow through the houses and not along the street only.

In the case of row houses, the length of the rows should therefore not run east and west if it can be avoided, and yet should be as nearly as possible transverse to the summer wind. If both these relations are not possible at the same time, the relation to the sunlight is likely to be the more important in northern climates, the relation to the summer night wind in southern climates. These

¹ See Standards Recommended for Permanent Industrial Housing Developments, p. 6 [p. 506, as here reprinted.]

² A revision in the light of further experience over an earlier standard of 50 feet.

same considerations are true, to a less degree, of semidetached or free-standing houses in lines with minimum side clearance.

Community facilities.—Besides the dwellings, each community should in most instances have access to locations for approximately the following facilities, or some substitute therefor, either already existing and accessible or to be provided in connection with the development:

1. Stores, post office, etc.
2. Elementary schools, high school, playground for little children, playgrounds for boys and girls, playfields for young men, open areas for rest and recreation.
3. Buildings for community activities and recreation, including theaters, moving pictures, dancing, and other indoor amusements; buildings or rooms for Y. M. C. A., Y. W. C. A., K. of C., or other societies and organizations; buildings providing for meetings, lectures, entertainments, etc., including special provisions, such as gymnasiums, swimming pools, reading rooms, etc.
4. Hospitals, churches, transient hotels, restaurants.
5. Accommodations in buildings and work yards for various necessary community services: policing, fire protection, public-health service, cleaning, maintenance, and repair of streets and sewers, and of other public works and public grounds; removal of ashes, garbage, and rubbish; general administrative offices.

Note as to outdoor recreation facilities: Parks and playgrounds.—Some playgrounds for little children may be provided in the interiors of blocks, preferably with sufficient accessibility from the streets to allow of supervision by the regular police force of the community. It will be necessary, however, in playgrounds of any size, to provide also some responsible person to oversee the children. There should be a little children's playground next the grade and primary school, where there is such a combined school. Within the square mile tributary to this school, if so much populated area is tributary, there should be about three more playgrounds, or four in all, presumably each in connection with a primary school, as it is found that little children will not go much over a quarter of a mile to school or play. Larger children may go a half mile.

Assuming 4 per cent of the population to be little children, a (maximum) density of population of 50,000 people per square mile gives 500 children per playground. On this basis two-thirds of an acre is a sufficient minimum for each playground.

For the population of any community of 1,000 people or over there should be a playfield of at least 6 acres on reasonably flat land for baseball, football, etc. This area need not, perhaps, be fully developed at once, but it should be acquired and set aside at once, since its need will be greater and its cost higher with the future growth of population.

Though access to large out-of-town parks, present or future, must be considered, it is no part of the contemplated development to provide such parks, but rather a function of the whole local community.

There should be provided, however, in so far as they do not already exist, smaller parks and open spaces usually aggregating at least 8 per cent of the total gross area of the land developed.

These "parks," "squares," and other open spaces should take advantage, in their location, of topographic opportunities, such as stream banks, and of land not better available for other purposes, such as cliffs and broken ground, but they should in any case preferably be so disposed as not to leave any compact building areas of more than 50 acres without some such provision, large or small.

When these open spaces exist in greater amount than is required, either through previous provisions or for topographic reasons, it may sometimes be possible to diminish the amount of other open spaces, but open space not suitable for play does not replace playground space.

The town planner should investigate and should see that the committee of designers reports to the corporation, in connection with the preliminary plan for a development, the conditions as to general facilities of the sorts indicated, just what and how extensive and satisfactory facilities exist of each kind, what facilities are lacking, which of those that are lacking can probably be supplied best by existing local agencies, municipal or otherwise, and what steps should be taken to assure the necessary action. No negotiations looking toward the establishment of any kind of contractual relations with a municipality or public utility corporation or other local agency for furnishing any community facilities may be conducted except under the direction of the legal division of the corporation.

Grouping of community facilities.—Certain recreational and other public facilities may be suitably centralized and grouped for greater economy of construction, maintenance, and operation, and to give a dominant point of definite effect. The combination of various community activities in a few buildings gives larger architectural masses, more economical, and more important.

STREETS.

Thoroughfares.—Determine or predict what lines of through traffic, if any, there are to be considered, related to the present and future development of the surrounding areas, to the various centers of adjacent towns, railroad stations, industrial plants, etc.

Tentatively lay out these and such specialized thoroughfares as are necessary (e. g., street railroad routes, commercial traffic thoroughfares, automobile roads, parkways) which shall carry traffic through or past the property as efficiently as possible. Avoid cutting the property into unusable or ill-related parts.

Similarly locate secondary thoroughfares, particularly with regard to the industrial plant served by the property, but without unnecessarily opening residential areas to through traffic, especially commercial traffic.

Street-car tracks.—These should usually be confined to thoroughfares. A single track line with turnouts, and with car traffic in both directions, is seldom desirable except in suburban districts, since its capacity is very limited. Single lines in loops, returning on adjacent parallel streets, all traffic one way, are commonly better, and are used when unavoidable on narrow streets. Single line loops returning by a distant route are not desirable.

Two tracks on one wide street are usually the best arrangement. (See typical cross sections of streets.)

Width of roadways for thoroughfares.—Eight and one-half feet width of roadway per line of traffic in often used in determination of thoroughfares widths, giving 25¹/₂ feet, 34 feet, and 51 feet as desirable widths of usable pavement. Five lines of traffic is seldom a good arrangement, as the central line can not efficiently be used. A roadway width of beyond six lines is hardly likely to be needed. A surface street car requires 10 feet of street width, including clearance for passing. A two-track line requires, including the clearance between the two cars as well as between them and vehicles, a total of 20 feet. (See typical cross sections of streets.)

LOCAL STREETS.

Width.—Determine width of usable paved roadway by predictable traffic, commonly making the roadways as narrow as this traffic will allow (8 feet, or even about 7¹/₂ feet, is often used as the width of a line of traffic on local streets, giving 16 feet and 22 or 24 feet as desirable widths of roadway).

There must be considered also the desirability of turning automobiles at street corners without crossing the street and so interfering with all lines of traffic, and the possibility of using private entrance drives without splashing the mouths of these drives un-

duly. A 20-foot paved way with 15-foot radius curves is about the minimum to meet these conditions. Where no private entrances occur, however, a 16-foot way is enough if the traffic frequency demands no more, but street intersections on such a road should be made sufficiently large for the turning of automobiles.

Determine total width between property lines by necessary clearance between house-fronts, and summation of necessary widths of roadways, sidewalks, planting strips, and setbacks. Fifty feet between two-story house fronts is a minimum; 60 feet is better. Since part of this distance may be taken up by setbacks of the houses, the street width may be less than 50 feet, but less than 40 feet is seldom advisable.

Planting strips.—These are usually best placed between a sidewalk and the street for the following reasons: they give a more spacious appearance to the street; future widening of the road may be done cheaply at the expense of the planting strip; private entrances may splay in the planting strip without unduly interrupting the sidewalk; differences of elevation of sidewalk and street may be taken up; sometimes curbs may be eliminated, using a sod edge or even a sod gutter; a space for piling snow is thus provided; and mud spatter of pedestrians by automobiles is reduced. Water and sewer pipes may be laid in the main planting strip, between the trees and the street. (See Instructions to Engineers.)

A strip from 1 foot to 3 feet wide may be left between the sidewalk and the property line to allow for future widening of sidewalk and for spreading of boundary hedges, etc., without interfering with pedestrians.

Trees and turf are usually all the vegetation that will be decently maintained in planting strips. The trees should be, when possible, 6 feet from the curb line of the pavement, to allow of pipe laying and future street widening, if the design is such that this widening may later be required. This makes a minimum desirable width of planting strip under these circumstances of 7 feet, and a better width, 9 feet. (See street cross sections, p. 501.)

Sidewalks.—These should usually have a smooth waterproof quickly drying surface, e. g. cement-concrete, asphalt or tar-concrete, brick, stone slab. Three and one-half feet may be taken as a minimum width, this giving room for two pedestrians, or room for one pedestrian and a baby carriage to pass. A width of $4\frac{1}{2}$ feet is usually enough on local residential streets, being room for one pedestrian to pass two, or for two baby carriages to pass. (See pp. 501 and 502.)

Gutters, curbs, and drain inlets.—Drain inlets should not be placed directly where pedestrians cross the streets. If they make a break in the gutter gradient, they should preferably not be on corners where wheeled traffic will strike them. They should not be unduly conspicuous through excessive size. (See standard details.) Gutters should not carry past the sidewalk crossing such an amount of water, in an ordinary rain, as to be difficult to step across. The gutter gradient should normally parallel the gradient of the road, but should only exceptionally be less than 0.5 per cent even with a smooth concrete surface; 0.7 per cent is better if obtainable. The curb reveal may vary from 4 to 9 inches or more in exceptional cases. Six inches is sufficient where the volume of flow does not require more.

Alleys.—Alleys should be used behind row houses, stores, etc., which must be served from behind, but otherwise only where local custom very strongly demands them. When used, they should

be public ways, lighted, paved over a width of at least 7 feet, with at least 12 feet between boundaries; 16 feet is better. If fenced, fences should be of metal or similar open material only. When possible, alleys should be laid out so as to have no portion entirely concealed from some point on a street. Alleys running in a straight line from street to street are preferable. (See pp. 501 and 502.)

Street furniture.—The appearance of street signs and of mail, police, and fire-alarm boxes should be considered by the town planner, and although stock forms should almost always be used, he should suggest to the committee of designers which of the available types seem to him most desirable.

Notes on utilities.—(See also, especially, Instructions to Engineering Designers.)

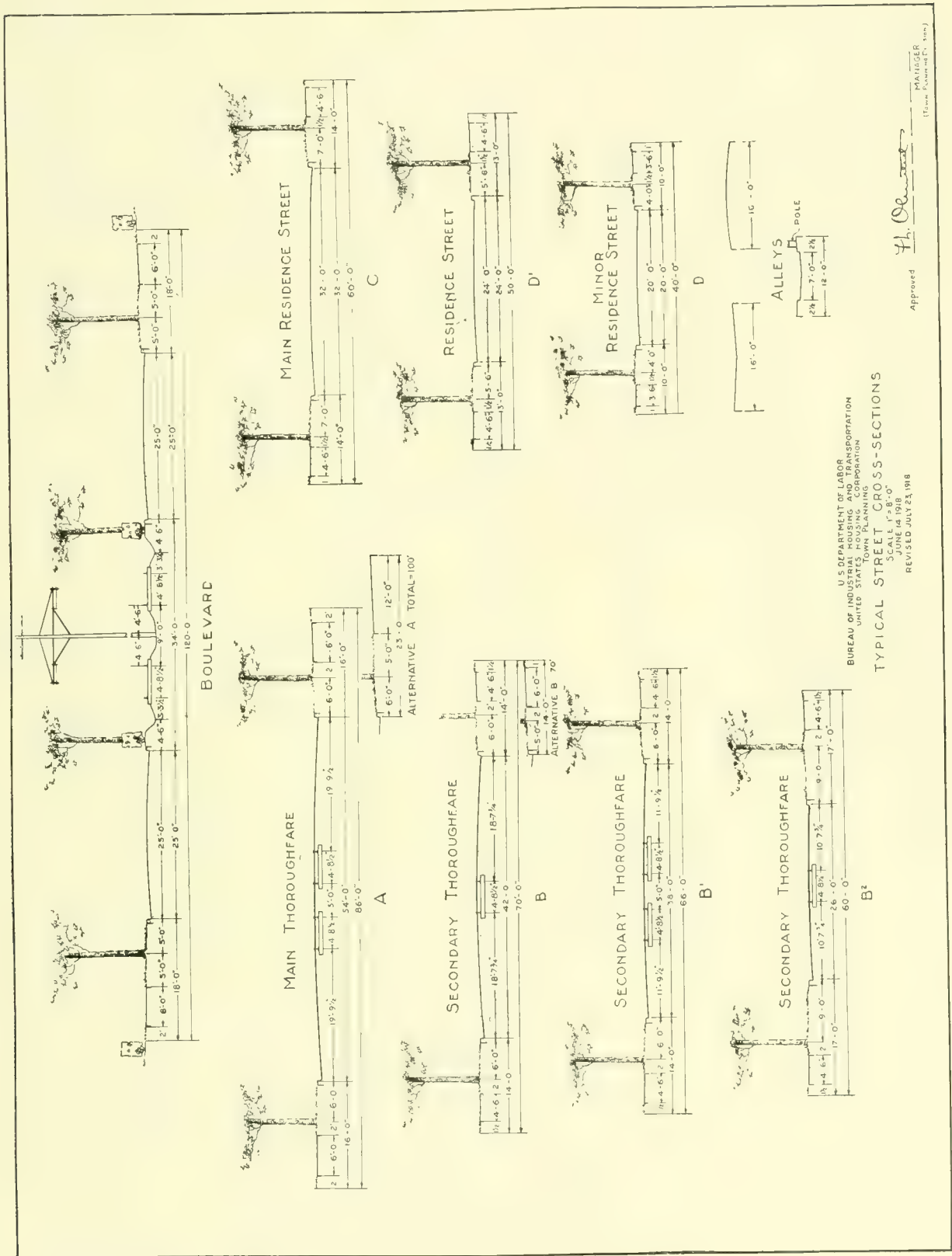
Water supply and fire protection.—Since fire hydrants should be accessible from the street, the water-pipes are usually most economically laid under the planting strip or under the roadway, and not behind the houses. Hydrants are well located close behind the street curb. Hydrants should be simple in design.

Sanitary sewers.—These may be laid under the roadway or under the planting strip or along the back lines of the lots. Considerations determining the choice of these locations are the lot depth, street width, house setback, and house plan, which determine whether the plumbing stacks in the house are nearer the backline of the lot or the center line of the street; and the use of the back yard, which determines how much of a hardship it will be upon the owners to keep sufficiently unencumbered the necessary right of way, 6 feet wide or more, for the pipes. Very wide streets are sometimes more economically sewered with one sewer on each side. Steep slopes may best have one sewer in the street, and another on the back line of the lots. Where the gradient of a sewer slopes in the same direction with the center line of street, sewer gradient to outfall must be considered in determining street gradient, and therefore street locations, to minimize depth of cut for sewers.

Storm sewers and combined sewers.—Since these take water from the street gutters, they must usually run either under the roadways or under the planting strips. The second is the better location when sufficient clearance of the trees may be obtained, since it minimizes the cutting up of the roadways for sewer repairs.

Gas.—These pipes are usually laid under the streets, but in some cases may be better laid between the sidewalks and the property line if streets are very broad, or along the back lot line, to minimize danger to tree roots, especially when the gas mains must be laid rapidly or in recently filled ground.

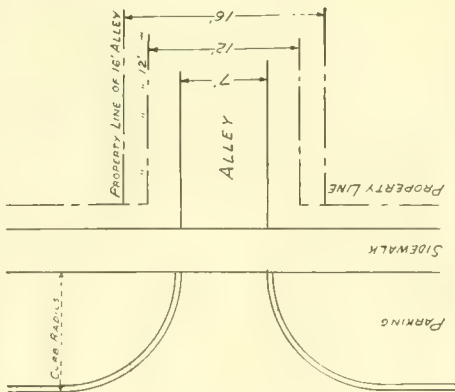
Electric light and telephone.—Normally one pole line for street lighting, house lighting, and telephone would best be located on the rear lot line, the overhead wires crossing as few and as unimportant streets as possible. It is not desirable, on account of maintenance difficulties, to install a wire system partly overhead and partly underground. If in an exceptional case the development warrants the expense of light standards, the town planner should suggest to the committee of designers which of the available stock forms seem to him best. If the development warrants underground wires for street lighting, these wires should form an independent system laid from standard to standard, and the lighting wires and telephone wires for the houses may be on another circuit carried on poles on the back lines of the lots, so minimizing the number of poles in the streets.



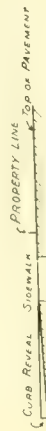
U. S. DEPARTMENT OF LABOR
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
UNITED STATES HOUSING CORPORATION
TOWN PLANNING

**SIDEWALKS AND CURBS
(SAMPLE ARRANGEMENTS)**

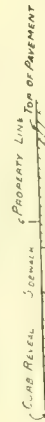
SCALE 1" = 8'



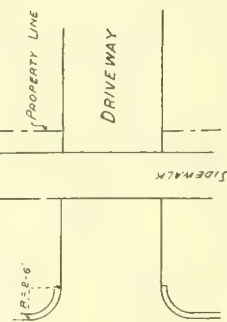
PLAN OF ENTRANCE TO ALLEY



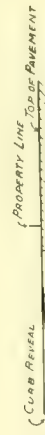
PROFILE OF ENTRANCE TO ALLEY



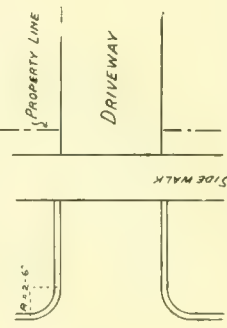
PROFILE OF GARAGE ENTRANCE
TYPE "A"



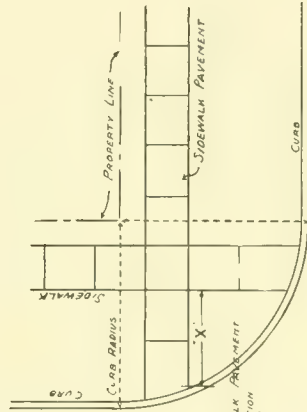
PLAN OF GARAGE ENTRANCE
TYPE "A"



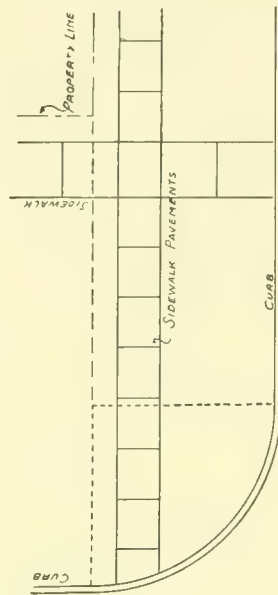
PROFILE OF GARAGE ENTRANCE
TYPE "B"



PLAN OF GARAGE ENTRANCE
TYPE "B"



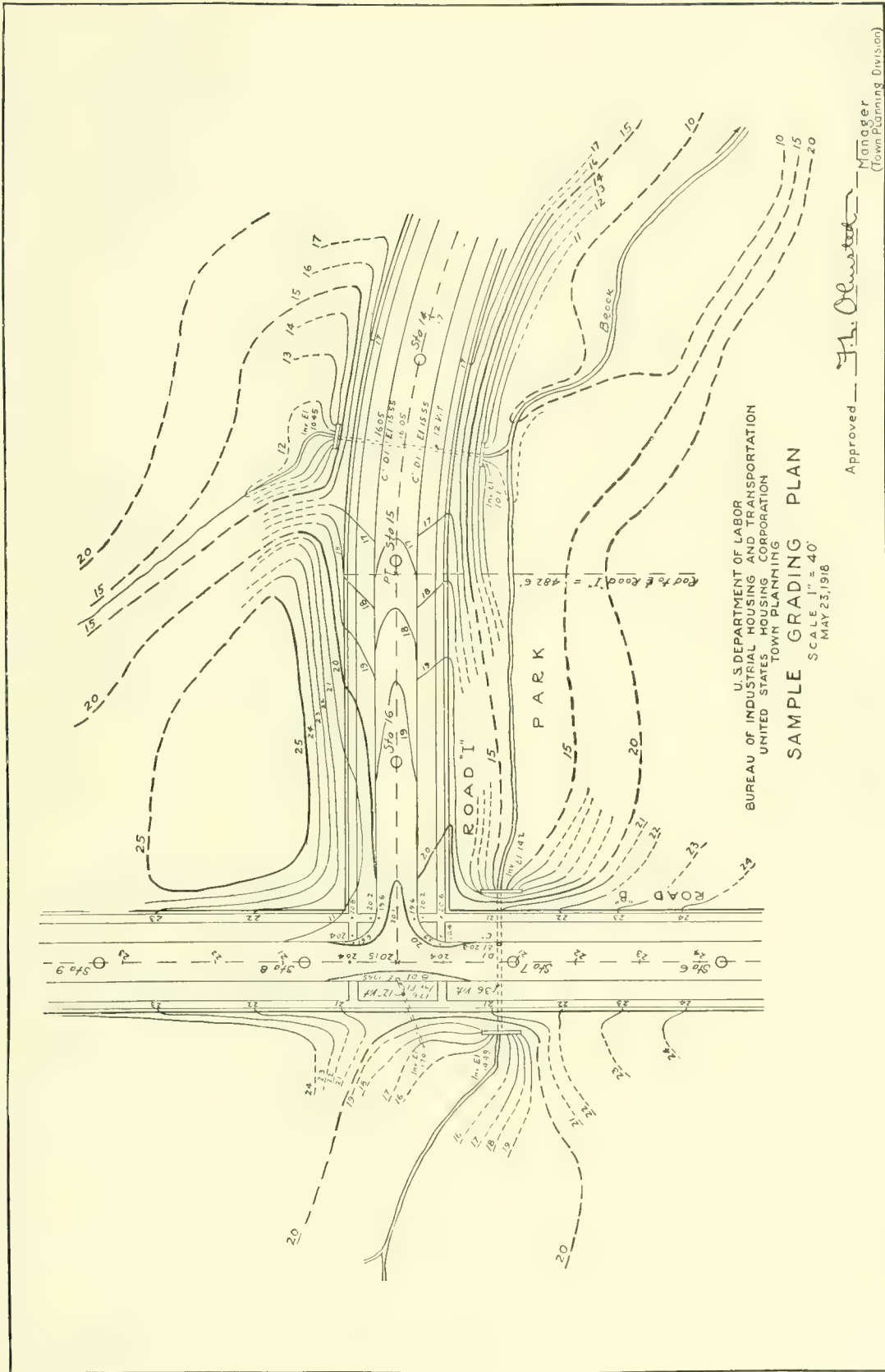
SIDEWALK INTERSECTION
ON STREETS OF SAME WIDTH



SIDEWALK INTERSECTION
ON STREETS OF DIFFERENT WIDTHS

Approved *F. H. Olmsted*

MANAGER
TOWN PLANNING DIVISION
JUNE 3, 1918.



APPENDIX X.

STANDARDS RECOMMENDED FOR PERMANENT INDUSTRIAL HOUSING DEVELOPMENTS.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, MARCH, 1918.

ACKNOWLEDGMENT.

The following standards for permanent buildings to be constructed for the housing of industrial war workers were adopted by the Bureau of Industrial Housing and Transportation of the Department of Labor, in consultation with Mr. Lawrence Veiller, secretary National Housing Association, on March 7, 1918. The original draft was prepared by Mr. Veiller. It was discussed and modified in a series of conferences in the course of which the following persons took part and offered helpful suggestions:

Grosvenor Atterbury, architect, member of the Committee on War-time Housing of the National Housing Association.

Alexander Bing, secretary of the Housing Committee of the Emergency Fleet Corporation.

Charles B. Ball, chief sanitary inspector, Chicago.

Owen Brainard, architect and engineer.

Arthur C. Comey, landscape architect.

Francis Dykes, real estate department, Bethlehem Steel Co.

Otto M. Eidlitz, civil engineer and builder.

James Ford, professor of social ethics, Harvard University.

Philip Hiss, architect, chairman Section on Housing, Committee on Labor, Council of National Defense.

John Ihlder, housing investigator.

Harlean James, executive secretary Section on Housing, Committee on Labor, Council of National Defense.

Walter H. Kilham, architect.

Robert D. Kohn, architect, member of the Housing Committee of the Emergency Fleet Corporation.

Joseph D. Leland, 3d, architect.

Perry R. MacNeille, consulting architect to the Emergency Fleet Corporation.

Horace B. Mann, architect.

Marcia Mead, architect.

John Nolen, landscape architect, member of the Committee on War-time Housing of the National Housing Association; member of the Housing Committee of the Emergency Fleet Corporation.

Frederick Law Olmsted, landscape architect, member of the Committee on Emergency Construction, Council of National Defense.

E. L. Palmer, jr., architect.

William C. Post, architect.

Lincoln Rogers, Bureau of Yards and Docks, United States Navy.

I. N. Phelps Stokes, architect.

George S. Welsh, architect.

Lawrence Veiller, secretary National Housing Association; member of the Committee on War-time Housing of the National Housing Association.

HOUSING STANDARDS FOR PERMANENT CONSTRUCTION.

These standards are not intended as inflexible requirements, but any plans which fail to conform to them are not likely to be accepted unless supported by very strong reasons. Local build-

ing codes, housing laws, and similar ordinances are to be followed: *Provided, however,* That in case such local regulations permit or require anything not permitted by these standards the express approval of this bureau is to be obtained before departing from the standards as here outlined.

TYPES OF HOUSES.

(Principal types only.)

Type 1. Single-family house.

Type 2. Two-family house.

Type 3. Single-family house with rooms for lodgers or boarders.

Type 4. Lodging house for men.

Type 5. Hotel for men.

Type 6. Lodging house for women.

Type 7. Hotel for women.

Type 8. Tenement house.

Type 9. Boarding house.

I. GENERAL PROVISIONS.

All types of houses to conform to these general provisions and, in addition, to certain special provisions as later indicated.

1. *Arrangement.*—Row or group houses normally not to be more than two rooms deep.

2. *Basements.*—No living quarters to be in basements.

3. *Closets.*—Every bedroom to have a clothes closet, opening from the room. Built-in wardrobe dressers will not be accepted. Normally such closets to be not less than 22 inches deep and with doors. Closets to be supplied with rods to take coat hangers.

4. *Cooking.*—Gas preferred, but flue for coal stove to be provided; all flues to be lined. The question of whether or not cook stoves are to be provided with the house to be considered at the time materials are being ordered.

5. *Fences.*—Board fences will not be accepted. Hedges or open metal fences desirable. Suitable arrangements for drying clothes to be provided. Where there are open metal fences the fence standards can be designed for this purpose.

6. *Furniture space.*—Beds to be indicated to scale on plans (double beds, 5 feet by 6 feet 6 inches; single beds, 3 feet by 6 feet 6 inches). Location of beds not to interfere with windows, or doors. It is recommended that beds be free standing and not located in a corner or with the side against a wall. Space to be provided for two pieces of furniture in addition to bed. Halls, stairs, and doors to permit easy moving of furniture.

7. *Gardens.*—Allotment gardens, conveniently accessible, preferable to increasing the size of the lot to provide for individual backyard vegetable gardens.

8. *Lighting.*—Electricity preferred.

9. *Materials of exterior.*—Materials dependent on local supplies; brick, terra cotta, stone, or concrete preferred. Outer walls to be insulated against dampness and condensation. Rat nogging to be provided. Roof to be fire resisting; leaders and gutters not essential unless drip will do harm.

10. *Open spaces.*—Side-yard space between adjacent buildings to be preferably 20 feet; minimum, 16 feet; such space to be increased proportionately for each additional story, or part of story, above two stories. If this space is not obtainable because of lot sizes or land values, houses should be built in rows or groups.

Rear-yard depth not to be less than height of building, nor in any case less than 20 feet. Minimum distance between backs of houses to be 50 feet. Consideration to be given as to whether sites should be provided for garages. When not an integral part of the house, garages should preferably be at the rear of the lot, should not be located closer than 15 feet to the nearest part of house, and should not exceed one story in height.

Front yards or setbacks desirable where practicable; minimum distance from front of house to front of opposite house to be 50 feet.

Covered porches to be considered part of building.

11. *Plumbing.*—House drain under house and 5 feet outside to be extra heavy cast iron. Vitrified clay pipe, with proper joints, may be used where ordinance permits. It is recommended that soil and waste pipes be extra heavy cast iron or genuine wrought iron. Soil and waste pipes to be extended through roof. A 3-inch soil stack preferred where not more than two water-closets are placed on one stack.

Water-closets to be porcelain and wash down, siphon, or siphon-jet type, with individual flush tank. Open-front seat recommended. Outdoor water-closets will not be accepted. Privies will not be accepted. Cellar water-closets not permitted except where supplementary to accommodations herein required.

Access to water-closet compartments to be from hall or vestibule, never solely from a room. Plunger, pan, long-hopper, and range closets will not be accepted.

Hot and cold water to be provided to all fixtures, with proper drains and shut-offs. Wooden sinks and wash trays will not be accepted.

All fixtures to be separately trapped except in batteries of wash trays and combined sink and wash tray, where one trap is sufficient.

Venting of traps to conform to approved practice, except that the back venting of the top or only fixture on a line is not required. Sink and lavatory traps to be connected direct to the vertical wastes, and not to floor branches. Exposed pipes preferred, and, when exposed, wrought iron preferred. Where possible, lines to be concentrated and kept from outside walls.

12. *Porches.*—Desirable. To be of durable construction, particularly the foundations; to be restricted from encroaching on minimum side yard or unduly darkening rooms.

13. *Rear entrances.*—In the case of row or group houses there may be access to the rear through minor one-way public streets. Such streets to be not less than 12 feet wide; to be properly paved, curbed, drained, and lighted. Private alleys will not be accepted.

14. *Roof air space.*—In every house there shall be a minimum clear space of 8 inches between the ceiling and the roof; this space to be provided with adequate waterproof openings for ventilation, at both ends if practicable.

15. *Rooms, number of.*—Bathrooms are not to be counted as rooms.

16. *Stairs.*—Risers to be not more than 8 inches high and treads to be not less than 9 inches wide. Winding stairs will not be accepted except in types 1, 2, and 3. Not more than 2 winders will be allowed in series. Treads must measure at least 9 inches wide 18 inches from rail.

17. *Ventilation.*—Every room to have at least one window opening directly to the outer air. Two windows in each room generally preferred; one window sufficient in small bedrooms. Each room to have a window area of not less than 12 square feet.

Cross ventilation as direct as possible to be provided for all rooms through windows, transoms, or doors; communicating door recommended between front and rear bedrooms in row houses.

Every bathroom to have window of not less than 6 square feet in area opening directly to the outer air.

Every water-closet compartment to have a window of not less than $4\frac{1}{2}$ square feet in area opening directly to the outer air. A skylight in the roof, with an equal amount of glass area and provided with adequate ventilators, will be accepted in lieu of such window, but skylights are not desirable.

18. *Windows.*—Minimum area to be measured between stop beads. Window head to be as near ceiling as practicable. Windows may be double-hung, pivoted, or casement. If double-hung, upper and lower sash to be the same size. In cities with soft-coal smoke nuisance, minimum area to be increased.

Window frames to be designed to accommodate screens and outside shutters. In cold climates, weather strips are recommended.

II. SPECIAL PROVISIONS FOR TYPES 1, 2, AND 3.

In addition to complying with all general provisions, types 1, 2, and 3 are to comply with the following special provisions:

Type 1. Single-family house.

Type 2. Two-family house ("Two-flatter," one family upstairs, one down. For "double house," see single-family house, semidetached.")

Type 3. Single-family house with rooms for not more than three lodgers or boarders.

1. *Arrangements.*—Types 1 and 3 not to be over $2\frac{1}{2}$ stories high. Type 2 not to be over 2 stories high.

When detached or semidetached, types 1, 2, and 3 normally not to be over 3 rooms deep; when in rows or groups, not to be over 2 rooms deep except that the end house of row may be 3 rooms deep.

2. *Cellar.*—To be well lighted, cross ventilated, dry, and paved or cemented. Minimum clear height under joists, 6 feet 6 inches. When hot-air furnaces are used, minimum height 7 feet. Cellar not essential under whole house. Where climatic or soil conditions make cellar inadvisable it may be omitted, in which case adequate provision is to be made for storing fuel. Where cellar is omitted, house to be set up on masonry piers or walls 2 feet clear from ground; space to be drained, inclosed, and ventilated.

3. *Grouping.*—Single-family houses of the more expensive type preferably to be detached houses, but may be semidetached or even attached in rows or groups. In other cases where land values permit, detached or semidetached are desirable; otherwise attached in rows or groups.

4. *Heating.*—Provision to be made for heating houses. If not otherwise heated, bathroom to be heated from kitchen stove.

5. *Materials of exterior.*—Brick, terra cotta, stone, or concrete preferred; but wood frame clapboarded, shingled, or stuccoed permitted for detached or semidetached houses not over $2\frac{1}{2}$ stories high. Party walls to be of brick, terra cotta, stone, or concrete.

6. *Plumbing.*—Bathtub (shower is not sufficient).

Lavatory, to be preferably in bathroom.

Sink to be in kitchen; rim 36 inches above floor.

Washtubs with covers, preferably two, rim 36 inches above floor, to be set in kitchen or in well-lighted, dry, and ventilated cellar.

Water-closet to be inside the house in well-lighted and ventilated compartment, with window of $4\frac{1}{2}$ square feet minimum area to outer air, and preferably with impervious floor not of concrete.

7. *Rooms, height of.*—Minimum, 8 feet.

Sloping ceilings and "knee walls" will be accepted only under the following conditions: Roof space above flat portion of ceiling to be of ample size and adequately ventilated; spaces between rafters of sloping portion to be adequately ventilated into roof space; bedroom to have greater window area and better cross ventilation than the minimum permissible for a standard flat-ceiling room; bedroom to have a minimum height of 8 feet over an area of at least 40 square feet with a minimum flat-ceiling width

of 3½ feet, and a clear height of not less than 6 feet over an area of at least 80 square feet with a minimum width of 7 feet.

8. *Rooms in attic.*—As a rule, in 2½-story houses, only one bedroom to be provided in the attic.

9. *Rooms, number and use of.*—In types 1 and 2: For higher-paid workers, five-room type preferred, with parlor, large kitchen, 3 bedrooms, and bathroom. Dining room and kitchenette may be provided in place of the large kitchen. Four-room type to be provided sparingly for higher-paid workers. Six-room type, with 4 bedrooms, or 3 bedrooms and parlor convertible into fourth bedroom, suited for abnormally large families only, and should be provided sparingly. Six-room type should normally have parlor, dining room, kitchen, 3 bedrooms, and bathroom.

For lower-paid workers, four-room type desirable, with parlor, kitchen, 2 bedrooms, and bathroom.

Any house having more than seven rooms to be treated as type 3.

In type 3, in addition to family quarters indicated above, single rooms for lodgers to be provided. In addition to the family water-closet accommodations, a water-closet compartment containing lavatory to be provided for the sole use of the lodgers. Lodgers to have access to their bedrooms and to their water-closet compartment without going through rooms designed for use of family.

10. *Rooms, size of.*—One large bedroom to be provided, size 10 by 12 to 12 by 14 feet.

Small bedrooms, minimum area, 80 square feet; minimum width, 7 feet.

Parlor, 10 by 12 to 12 by 14 feet.

Dining room, 9 by 12 to 12 by 14 feet.

Kitchen (where there is no separate dining room), 10 by 12 to 12 by 14 feet.

Kitchenette (only where there is a separate dining room), minimum width, 6 feet; minimum area, 70 square feet.

III. SPECIAL PROVISIONS FOR TYPES 4 AND 5.

In addition to complying with all general provisions, types 4 and 5 must comply with the following special provisions:

Type 4. Lodging house for men.

Type 5. Hotel for men.

1. *Arrangement.*—Provision to be made for 75 men or more. Height limited to 4 stories, except in large cities.

2. *Cellar.*—Minimum height, 7 feet; to be well lighted, cross ventilated, dry, and paved or cemented. Cellar not essential under whole building. Where omitted, building to be set up on masonry piers or walls 2 feet clear from ground; space to be drained, inclosed, and ventilated.

3. *Fire protection.*—If over 4 stories high, to be fireproof throughout. If over 3 stories high, and not over 4, first-floor construction to be fireproof.

If over 2 stories high, a nonfireproof building the area of which exceeds approximately 3,000 square feet to be divided by fire walls of brick, terra cotta, stone, or concrete into areas not exceeding approximately 3,000 square feet each. All openings in such walls to be provided with fireproof self-closing doors.

Adequate means of egress to be provided to street or yard by an additional flight of stairs, or by fire tower or stair fire escape (fire escape less desirable). All such additional means of egress to be remote from the main stairs and separated therefrom and from the other parts of the building by walls of brick, terra cotta, stone, or concrete, with fireproof self-closing doors at all openings. Such additional means of egress to be so located that no room shall be more than 40 feet from a means of egress. All main egress doors to swing out.

All stairs and stair halls to be not less than 3 feet wide in the clear and to be inclosed in walls of brick, terra cotta, stone, or

concrete, with fireproof self-closing doors at all openings. All doors to stair halls to swing into stair hall without obstructing free passage.

Dumb-waiters and elevators will not be accepted in stair inclosure; they should be inclosed in fireproof shafts with fireproof doors, those for dumb-waiters to be self-closing. Inside cellar stairs to be inclosed with walls of brick, terra cotta, stone, or concrete, with self-closing fireproof doors. Standpipes with hose reels on each floor to be so located that any point can be reached with 75 feet of hose.

4. *Heating.*—Except where connected with a central plant, provision to be made for independent heating.

5. *Materials of exterior.*—To be brick, terra cotta, stone, or concrete, except that wood frame will be accepted for 1-story buildings.

6. *Plumbing.*—Minimum provision: One water-closet per 12 men; one urinal per 16 men; one lavatory per 8 men; one shower per 10 men; one bathtub per floor, provided there is not less than one per 50 men. Ratio to be increased where there are less than 50 men per floor. Floor and base of toilet rooms to be waterproof not of concrete. Sufficient water-closets to be provided in the cellar of basement for the accommodation of engineers, firemen, and laundry workers.

7. *Rooms, height of.*—Height for public rooms, 9 to 12 feet; minimum for bedrooms, 8 feet.

8. *Rooms, number and use of.*—Each lodger to have separate room. Two-men rooms not permitted. (Cubicles and dwarf partitions will not be accepted.)

Each floor to have a general bathroom containing required showers, tub, and lavatories. Each floor also to have a general toilet room containing required water-closets and urinals. Each of the two rooms to have windows opening directly to the outer air, and to be separate but adjoining and communicating. Service closets with slop sinks and space for brooms and pails to be provided on each floor.

Smoking room, reading room, billiard room, physician's room, laundry for washing clothes, superintendent's office and adequate quarters for superintendent to be provided. Unless provided elsewhere in the community, bowling alleys to be in basement.

Hotel (type 5) also to have dining room and cafeteria with outside access thereto, and with pantry, service rooms, kitchen, and toilet facilities for men and women employees. An additional general toilet room is to be provided conveniently accessible.

9. *Rooms, size of.*—Single bedrooms to have a minimum area of 70 square feet and minimum width of 7 feet.

10. *Ventilation.*—Bedroom doors preferably to be placed opposite each other and to have transoms or slat panels.

11. *Windows.*—One window in each room to have minimum area of 12 square feet between stop beads.

IV. SPECIAL PROVISIONS FOR TYPES 6 AND 7.

In addition to complying with all general provisions, types 6 and 7 must comply with the following special provisions:

Type 6. Lodging house for women.

Type 7. Hotel for women.

1. *Arrangement.*—Provision to be made for 75 to 150 women (with less than 75 the unit is not economical; with more than 150 there are difficulties in management and supervision).

Height limited to 4 stories, except in large cities.

2. *Cellar.*—Minimum height, 7 feet; to be well lighted, cross ventilated, dry, and paved or cemented. Cellar not essential under whole building. Where omitted, building to be set up on masonry piers or walls 2 feet clear from ground; space to be drained, inclosed, and ventilated.

3. *Fire protection.*—If over 4 stories high, to be fireproof throughout. If over 3 stories high, and not over 4, first-floor construction to be fireproof.

If over 2 stories high, a nonfireproof building, the area of which exceeds approximately 3,000 square feet, to be divided by fire walls of brick, terra cotta, stone, or concrete into areas not exceeding approximately 3,000 square feet. All openings in such walls to be provided with fireproof self-closing doors. Adequate means of egress to be provided to street or yard by an additional flight of stairs, or by fire tower or stair fire escape (fire escape less desirable). All such additional means of egress to be remote from the main stairs and separated therefrom and from other parts of the building by walls of brick, terra cotta, stone, or concrete, with fireproof self-closing doors at all openings. Such additional means of egress to be so located that no room shall be more than 40 feet from a means of egress. All main egress doors to swing out.

All stairs and stair halls to be not less than 3 feet wide in the clear and to be inclosed in walls of brick, terra cotta, stone, or concrete, with fireproof self-closing doors at all openings. All doors to stair halls to swing into stair hall without obstructing free passage.

Dumb-waiters and elevators will not be accepted in stair inclosure; they should be inclosed in fireproof shafts with fireproof doors, those for dumb-waiters to be self-closing. Inside cellar stairs to be inclosed with walls of brick, terra cotta, stone, or concrete, with self-closing fireproof doors. Standpipes with hose reels on each floor to be so located that any point can be reached with 75 feet of hose.

4. *Heating.*—Except where connected with a central heating plant, provision to be made for independent heating.

5. *Materials for exterior.*—To be of brick, terra cotta, stone, or concrete, except that wood frame will be accepted for one-story buildings.

6. *Plumbing.*—Minimum provision: One water-closet per 10 women, one lavatory per 6 women, one body shower per 10 women, one bathtub per 25 women. Ratio to be increased where there are less than 50 women per floor. Floor and base of toilet rooms waterproof, not of concrete. Dwarf partitions between lavatories to extend at least 6 feet above the floor and have curtains. Sufficient water-closets to be provided in the cellar or basement for the accommodation of engineers, firemen, and laundry workers.

7. *Rooms, height of.*—Height of public rooms, 9 to 12 feet; minimum for bedrooms, 8 feet.

8. *Rooms, number and use of.*—Each lodger to have separate room. (Cubicles and dwarf partitions will not be accepted.) Rooms for two women not permitted. Each floor to have a general bathroom containing required body showers, tub, and lavatories. Each floor also to have a general toilet room containing required water-closets. Each of these two rooms to have windows opening directly to the outer air, and to be separate, but adjoining and communicating. Service closet, with slop sink and space for brooms and pails to be provided on each floor.

First floor to have matron's office so placed as to oversee the single entrance and access to sleeping quarters; to have reception parlors or alcoves (one for every 20 women), or large parlor with furniture arranged for privacy in conversation; also assembly hall with movable partitions and set stage.

Kitchenette, sitting room, and sewing room to be provided on at least alternate room floors. Matron's quarters, physician's room, and infirmary, laundry in which lodgers can wash their clothes, and trunk room to be provided.

Hotel (type 7) also to have dining room and cafeteria, with outside access thereto, with pantry, service rooms, kitchen, and toilet facilities for employees. An additional toilet room is to be provided, conveniently accessible.

9. *Rooms, size of.*—Single bedrooms to have a minimum area of 70 square feet and minimum width of 7 feet.

10. *Ventilation.*—Bedroom doors preferably to be placed opposite each other, and to have transoms or slat panels.

11. *Windows.*—One window in each room to have minimum area of 12 square feet between stop heads.

V. SPECIAL PROVISIONS FOR TYPE 8.

Type 8. Tenement house (including flats or apartments), a building occupied in whole or in part by three or more families.

Tenement and apartment houses are considered generally undesirable and will be accepted only in cities where, because of high land values, it is clearly demonstrated that single and two-family houses can not be economically provided, or where there is insistent local demand for this type of multiple housing. In any case, they will be accepted only where the Bureau of Industrial Housing and Transportation is convinced that local conditions require or justify their use. They must conform in general to local building ordinances, to the general provisions of these standards, and to other special provisions to be issued by the Bureau of Industrial Housing and Transportation.

VI. SPECIAL PROVISIONS FOR TYPE 9.

In addition to complying with all general provisions, buildings of type 9 must comply with the following special provisions:

Type 9. Boarding house. Where more than 3 and less than 25 rooms for lodgers are provided, building to be classed as boarding house. If 3 lodgers or less, building to be classed as type 3; if 25 or more, to be classed as type 4, 5, 6, or 7.

1. *Access.*—Lodgers to have access to their bedrooms and to their water-closet compartments and bathrooms without going through rooms designed for use of family. Separate outside entrance for lodgers recommended.

2. *Arrangement.*—Not to be over 3 stories high. Not to be over 2 rooms deep, except that the end house of rows may be 3 rooms deep.

3. *Cellar.*—To be well lighted, cross ventilated, dry, and paved or cemented. Minimum clear height under joists, 7 feet. Cellar not essential under whole house; where omitted, house to be set up on masonry piers or walls 2 feet clear from ground; space to be drained, inclosed, and ventilated.

4. *Fire protection.*—If frame, not to be over 2 stories high. If over 2 stories high, adequate means of egress to be provided to street or yard by an additional flight of stairs, or by fire tower or stair fire escape (fire escape least desirable). All such additional means of egress to be remote from the main stairs and separated therefrom and from the other parts of the building by walls of brick, terra cotta, stone, or concrete, with fireproof self-closing doors at all openings. Such additional means of egress to be so located that no room shall be more than 40 feet from a means of egress.

All stairs and stair halls to be not less than 3 feet wide in the clear and to be inclosed in walls of brick, terra cotta, stone, or concrete, with fireproof self-closing doors at all openings.

Dumb-waiters and elevators will not be accepted in stair inclosure; they should be inclosed in fireproof shafts with fireproof doors, those for dumb-waiters to be self-closing.

5. *Heating.*—Except where connected with a central plant, provision to be made for independent heating.

6. *Materials of walls.*—Brick, terra cotta, stone, or concrete preferred, but wood frame clapboarded, shingled, or stuccoed permitted for detached or semidetached houses not over 2 stories high.

7. *Plumbing.*—Family living quarters to have:

Bathtub (shower is not sufficient).

Lavatory, to be preferably in bathroom.

Sink to be in kitchen; rim 36 inches above floor.

Washtubs with covers, preferably two, rim 36 inches above floor, to be set in kitchen or in well-lighted, dry, and ventilated cellar.

Water-closet to be inside the house in well lighted and ventilated compartment, with window of $4\frac{1}{2}$ square feet minimum area to outer air, and preferably with impervious floor not of concrete.

In addition to above, a water-closet compartment containing lavatory to be provided for the sole use of the lodgers. Floor and base of toilet rooms to be waterproof, not of concrete.

The following minimum provisions to be made:

For men, 1 bathtub per 24 lodgers, 1 water-closet, and 1 lavatory per 8 lodgers, 1 shower per 10 lodgers; for women, 1 bathtub per 16 lodgers, 1 body shower per 10 lodgers, 1 lavatory per 5 lodgers, 1 water-closet per 8 lodgers. Dwarf partitions between lavatories for women to extend at least 6 feet above the floor and have curtains.

8. *Rooms, height of.*—Minimum, 8 feet.

9. *Rooms in attic.*—No lodgers' rooms in attic accepted.

10. *Rooms, number and use of.*—Each lodger to have separate room. Rooms for two lodgers not permitted. (Cubicles and dwarf

partitions will not be accepted.) Building to contain more than 3 and less than 25 rooms for lodgers. In addition to living quarters for one family, lodgers' bathrooms and toilet rooms containing showers, tubs, lavatories, and water-closets to be provided; preferably, bathroom containing showers, tub, and lavatories to be separate but adjoining and communicating with water-closet compartment. One of each such rooms preferably on each floor. Each of these two rooms to have windows opening directly to the outer air. Lodgers to have a common room, also dining room: the latter to be located near family kitchen; the common room to be conveniently accessible from the outside.

11. *Rooms, size of.*—Single bedrooms for lodgers to have a minimum area of 70 square feet and minimum width of 7 feet. Size of common room and dining room each to be proportionate to the number of boarders.

12. *Ventilation.*—Bedroom doors preferably to be placed opposite each other and to have transoms or slat panels.



APPENDIX XI.

STANDARD ARCHITECTURAL DRAWINGS: EXPLANATORY NOTES.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, UNITED STATES HOUSING CORPORATION,
ARCHITECTURAL DIVISION.

BASIC PLANS AND THEIR DESCRIPTION.

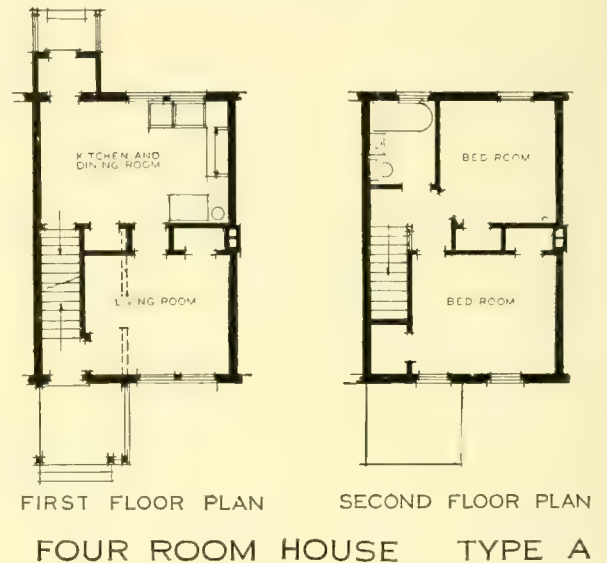
In reducing many variant plans to the following basic types, minor differences, especially placing the closets, door, and window locations, etc., are disregarded, and only the essentials in plan arrangements are considered. Nearly every one of the basic plans is capable not only of being reversed right for left but of being turned 90° in relation to the street front. The center stair types are capable of being reversed 90° in either direction, the entrance

in one case being at the foot of the stairs to the second floor with the stairs to the basement opening off the kitchen, and in the other case being at the head of the basement stairs with the stairs to the second floor accessible through the living room.

The plans as represented below are for four, five, and six room houses, as these were the most popular types constructed, and are intended to represent only essential points.

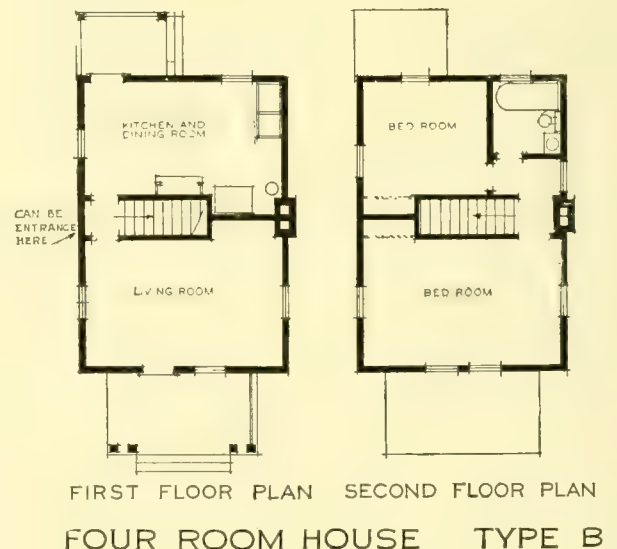
FOUR-ROOM PLAN: TYPE A.

This plan, with staircase at the side, admirably admits of its use as a row house, but is not so well adapted if used as a semi-detached house, due to the fact that an economical arrangement of combining this plan should call for chimneys and plumbing together. This would place the staircases to both apartments in the center, thereby giving combined porches. With stairs arranged as in this type, if a first floor hall is desired, it is a little wasteful, as the hall would naturally run the entire length of the staircase. This also gives a little larger second floor hall space. It will be noted by reference to the dotted lines on this plan, representing a front hall, that the living room becomes narrow. Also, on account of stair location in the average depth used for houses of this type, it does not admit of an economical closet arrangement, as the space over stairs on the second floor could not be utilized but for one closet.



FOUR-ROOM PLAN: TYPE B.

The B type plan as illustrated, with the stairs in the center of the building, is best fitted for either single or semidetached houses, as it admits of separated entrances and porches if used as semi-detached, with a minimum of hall space both upstairs and down. With this arrangement of stairs, it also allows for sufficient closet area for both bedrooms over the staircase, and best utilizes this space. We feel that of the two types plan B is more economical in arrangement, but is apt to be less economical in construction, especially on account of the requirements of two girders and bearing partitions. This plan, however, would have less partition area and would also give a larger living room if a hall is used, and a better front bedroom.

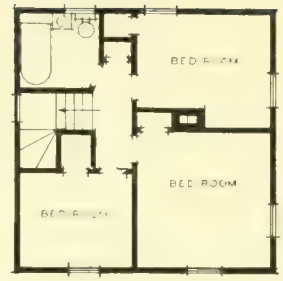


FIVE-ROOM PLAN: TYPES A-1, A-2, B.

On the five-room type A-1 and A-2, the same general advantages apply as to the four-room type A. On the five-room type B the same advantages apply as on the four-room type B, but this type does not admit economically of developing a second floor with three bedrooms as per type A.



FIRST FLOOR PLAN

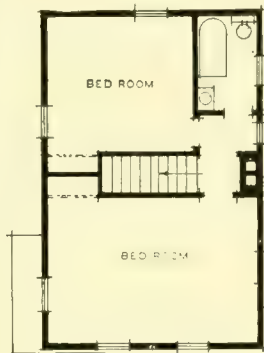


SECOND FLOOR PLAN

FIVE ROOM HOUSE TYPE A 1

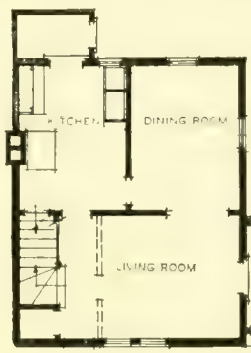


FIRST FLOOR PLAN



SECOND FLOOR PLAN

FIVE ROOM HOUSE TYPE B



FIRST FLOOR PLAN



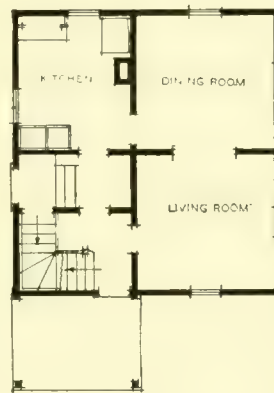
SECOND FLOOR PLAN

FIVE ROOM HOUSE TYPE A 2

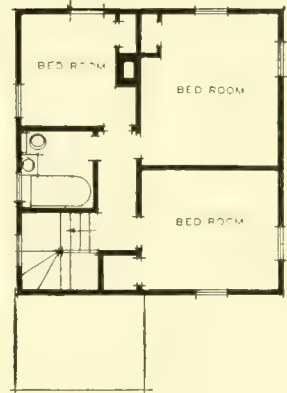
SIX-ROOM PLAN: TYPE A.

The same general descriptions apply to this plan as to the previous A types. The B type (or center stair) plan again would not adapt itself so economically with the area of three bedrooms on the second floor, due to increased second floor hall which would be necessary.

An excellent variant of the side stair type applicable to five-room houses with three rooms downstairs, and to six-room houses, is the double-run corner stair type. Excellent examples of these types might be seen under the Waterbury, Conn., project. Many monotype houses which would really not come under the basic plans as represented above have been used to meet special conditions for the individual project in which they occur. They may be found under the various projects, as illustrated.



FIRST FLOOR PLAN



SECOND FLOOR PLAN

SIX ROOM HOUSE TYPE A



APPENDIX XII.

PRELIMINARY REPORT ON RESULTS OF TESTS OF PLUMBING IN TYPICAL BUILDINGS OF DIFFERENT GROUPS OF HOUSES CONSTRUCTED BY THE UNITED STATES HOUSING CORPORATION AT BRIDGEPORT, CONN., MADE FEBRUARY 25, 26, 28, AND MARCH 1, 7, AND 8, 1919.

NEW YORK, March 13, 1919.

To the PRESIDENT OF THE UNITED STATES HOUSING CORPORATION.
Washington, D. C.

DEAR SIR: In response to your request the following preliminary report on the plumbing in the buildings of the United States Housing Corporation at Bridgeport, Conn., is submitted by the Committee appointed to test the plumbing.

This report is officially concurred in by all the members of the committee.

Committee.—The members of the committee, appointed by the United States Housing Corporation to conduct the tests, are:

Mr. Albert L. Webster, Consulting Engineer, N. Y. City, Chairman.

Dr. W. Paul Gerhard, Consulting Engineer, N. Y. City, Secretary.

Mr. Chas. B. Ball, Chief Inspector, Division of Sanitation, Department of Health, Chicago, Ill.

Mr. Nelson S. Thompson, Chief Mechanical Engineer, Supervising Architect's Office, Washington, D. C.

Mr. J. W. McCarthy, Plumbing Contractor, Washington, D. C.

Purpose of tests.—The purpose of the tests was to determine if the plumbing installed in the buildings constructed by the United States Housing Corporation in Bridgeport is safe, in the opinion of the Committee.

The committee was also asked to express its opinion of the character of the plumbing, viewed as a war necessity and designed and installed under restrictions imposed by the War Industries Board.

Types of buildings tested.—Four types of buildings were tested. These were stated to represent all the different designs of plumbing in the several groups of buildings constructed by the United States Housing Corporation at Bridgeport. The types tested were as follows:

Type G-2, Black Rock group.—Three story, double apartment house, providing accommodations for two families on each floor—six families in all.

Type J-2 Mill Green group.—Pair of two-story, semi-detached houses, providing accommodations for two families, each family occupying half of building separated by a party wall.

Type H-1, Mill Green group.—Two story 2-flat house, providing accommodations for two families (super-imposed apartments), one family on each floor.

Type H-3 Mill Green group.—Two story 2-flat house, providing accommodations for two families (super-imposed apartments), one family on each floor.

Critical type.—The type of building in which the plumbing will be subjected to the most severe service is Type G-2, Black Rock group, three-story apartment, housing six families. The committee, therefore, applied extensive tests to this type of building.

TEST OF THREE-STORY APARTMENTS, TYPE G-2, BLACK ROCK GROUP, HOUSING SIX FAMILIES.

Comparison of anti-siphon traps and vented traps.—The committee had two similar buildings of the group equipped with different systems of plumbing—one represented the United States Housing Commission's system, using anti-siphon traps without back ventilation pipes (as shown on blue prints attached hereto) and the other represented the Bridgeport system of vented traps, known as "P" or "1/2-S" traps.

Controlling limits.—Although there were minor differences in the two installations, the committee is convinced that the installations were comparable, and the committee is also convinced that the results of the tests of the two buildings permit fair conclusions to be drawn as to the safety of the United States Housing Corporation system.

In regard to the three story apartment type of building, (G-2), the committee emphatically limits its conclusions to buildings in which the plumbing design is like that in the United States Housing Corporation building tested, the essentials of which are as follows:

Buildings three stories high, with cellar beneath; Two stacks of 4 inch diameter soil pipes, one for each half of building.

Soil stack not over 42 feet high, with one group of fixtures on each living floor and one sink in the cellar.

Each group of fixtures consisting of 1 water-closet, 1 bath tub, 1 lavatory, 1 kitchen sink, 1 laundry tray.

All fixtures grouped close to soil stack.

The developed length of any waste or soil branch not exceeding 4 feet from soil stack to seal of trap.

One rain leader, 4 inches in diameter, for the entire roof area, not exceeding 1,800 square feet.

The main drain in cellar, beyond junction of the two soil pipes and the rain leader, not less than 5 inches in diameter; no house trap, or fresh air inlet, on the house drain.

Individual discharges from fixtures not exceeding the following rates:

Water-closets, 35 gallons per minute (3 gallon flush).

Baths, 14 gallons per minute.

Combination sink and laundry tray 18 gallons per minute.

Lavatories, 6 gallons per minute.

Anti siphon traps of the two kinds installed in the United States Housing Corporation buildings, as shown on the blue prints hereto attached.

Bend traps (P traps) of the kind installed in the Bridgeport building.

With the above restrictions limiting its conclusions, the committee finds for three-story buildings of the Black Rock group (G-2).

Results at Black Rock group.—(a) The critical floor, under all kinds of test, is the first floor.

(b) The United States Housing Corporation system resists siphonage better than the Bridgeport system.

(c) The Bridgeport system resists back pressure better than the United States Housing Corporation system.

(d) In the committee's opinion, failure through siphonage is more serious than failure through back pressure.

(e) The United States Housing Corporation system in the Black Rock group should be corrected to resist back pressure by the addition of a 2-inch air-relief pipe at each stack, properly connected to the water-closet and bath fixtures on the first floor and extended to the roof, with 4-inch increased diameter before passing through the roof.

Tests severe.—The committee realizes that the tests applied to both buildings were severe and searching, and, perhaps, subjected both systems to stronger strain than will occur often in actual service, but it believes that any system of plumbing should have a sufficient factor of safety, and it believes the tests applied were not too strong to ensure such safety.

Effect on fouling on both systems.—The committee realizes that both systems would show modified results when the two systems have fouled in actual service, but in its opinion the extent of fouling will not reduce to danger point the trap seals of the two kinds of anti siphon traps used in the United States Housing Corporation system, nor does it believe that the fouling of the Bridgeport system traps and vent pipes will be sufficient to endanger that system.

Recommends tests for fouling.—The committee thinks this question of the effect of fouling on both antisiphon and bend traps of sufficient importance to warrant actual tests and experiments, and it recommends that these be made under competent supervision.

Patented articles.—The committee is satisfied that no traps, or plumbing fittings, used in either of the Black Rock buildings tested, were controlled by patent or other proprietary restraint, and that any manufacturer of plumbing goods can make them.

TESTS OF TWO-STORY BUILDINGS.

Two-story buildings.—The tests of two-story buildings were conducted at the Mill Green group.

Type J-2 is arranged for one family in each half of the building, separated by a party wall. Each half of the building has a 4-inch soil stack extending through the roof, with water-closet, bath, and lavatory close to the soil stack on the second floor, and a combination sink and laundry tub on the first floor, distant from the soil stack about 11 feet 6 inches. The two soil stacks drop under the cellar floor, unite in a 4-inch main drain which passes out of the front of the building and connects with a 6-inch tile house sewer. There is no house trap or fresh-air inlet. The waste of the combination fixture is not extended to the roof.

Type H-1 and H-3 buildings are two-flat houses, that is, superimposed apartments, arranged for one family on each floor. There is one 4-inch soil stack, extended through the roof, and one 2-inch waste stack, extended through the roof without enlargement at roof. The base of the 2-inch waste extends across the cellar ceiling, and connects with the 4-inch soil stack. The soil stack drops under the cellar floor, passes out of the building at the front wall, and

connects with a 6-inch tile sewer. There is no house trap or fresh-air inlet.

General, for two-story buildings.—In all of the two-story buildings the lavatory traps are the same kind of antisiphon traps used in the lavatory in the Black Rock group building. The bath and combination fixture traps are antisiphon, 4 by 5 inch drum traps, made up of stock fittings.

In all of these buildings the water-closets have flush tanks. There is no rain water connected with the plumbing drains. Outside leaders are used.

At the second floor, in some of the buildings, a special combination fitting is used for the water-closet and bath tub.

RESULTS OF TESTS OF PLUMBING IN THE DIFFERENT TYPES OF TWO-STORY BUILDINGS.

Results of tests in two-story buildings.—No traps were siphoned so as to endanger the water seal of the traps. No back pressure was shown that endangered the water seal of the traps, but the committee thinks it advisable to increase the 2-inch waste vents to 4 inches before passing through the roof, or that they be otherwise protected against frost closure.

CONCLUSIONS.

I. In the buildings examined and tested the committee finds the work well done and the workmanship good.

II. Having in mind the war standards and the restrictions imposed by the War Industries Board for conserving metal, the committee finds the design, workmanship, and material of the plumbing are justified, and the plumbing is reasonably safe for a limited number of years, and is not a menace to health.

III. The three-story apartment building at Black Rock (type G-2) showed insufficient protection against back pressure at the water-closet and bath on the first floor, under the most severe conditions of the test applied, which conditions would be of very infrequent occurrence in actual service.

This defect, however, should be remedied, and can be done most cheaply by installing a 2-inch back-pressure relief pipe at each stack in these buildings, as hereinbefore specified.

This pipe is not recommended to prevent trap siphonage, but is required to prevent back pressure.

If the plumbing is improved as above specified, the committee would consider it safe.

IV. In the two-story, two family buildings of types H-1 and H-3, having a 2-inch vent to the roof from combination fixture of sink and laundry tray on two floors, the committee recommends that the 2-inch vent be increased to 4 inches before passing through the roof, or be otherwise protected against closure by frost. If the plumbing is improved as above specified, the committee would consider it safe.

Future report.—This report will be followed in time by a full statement of the committee's work.

Respectfully submitted.

ALBERT L. WEBSTER,

Chairman.

DR. W. PAUL GERHARD, C. E.,

Secretary.



APPENDIX XIII.

INSTRUCTIONS TO NEGOTIATORS.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, UNITED STATES HOUSING CORPORATION, REAL ESTATE, TOWN PLANNING, AND LEGAL DIVISIONS.

1. After the bureau has passed upon the report of the committee on sites, the Town Planning Division shall furnish the Real Estate Division with a description of the properties proposed to be acquired. In some cases this description may be a complete legal description accompanied by an accurate survey of the metes and bounds; otherwise it is to be a sufficient description to enable the Real Estate Division through its negotiator to identify the properties approved by the bureau so as to obtain the legal description thereof after his arrival at the locality. The general manager will give the negotiator the name of the man who will be locally in charge of surveying parties for the bureau.

2. The Real Estate Division shall then designate a representative or negotiator, who shall have the discretionary authority to take options or make contracts for the purchase of real estate, subject to the limitations set forth below and supplementary instructions from the chief of the Real Estate Division in any specific case.

3. Such options as may have been taken by the representative of the Real Estate Division on the committee on sites shall be turned over to the negotiator for his use, together with a copy of the official appraisal on each parcel of property to be acquired. In the absence of such official appraisal the negotiator shall, as soon as possible, furnish the Real Estate Division with information and data upon which an official appraisal can be based.

4. The negotiator shall so far as possible enter into contracts with owners for the purchase of properties at prices not to exceed the official appraisal, holding the power of commandeering in reserve. These contracts should normally include the right of immediate entry upon the property subject to payment for any damages which may be caused by such entry in case the sale is not completed; the form of contract to be furnished by the Legal Division.

5. If unexpected difficulties in purchase, or the surveys and studies of the committee of designers, suggest the advisability of modifying the boundaries of the approved acquirements or of considering alternate sites:

(a) In case of minor modifications the negotiator may proceed without waiting for specific approval from the bureau, but for the bureau's records, in all such cases, a report signed jointly by himself and the town planner is to be sent promptly by mail to the bureau explaining the modifications agreed upon and the reasons for them.

(b) In case of radical changes of location the joint recommendations of the negotiator and the town planner are to be submitted to the director and his approval secured before closing contract for purchase.

In view of the probable desirability of such changes, the negotiator should keep in close touch with the town planner and the development of his plans.

6. If the negotiator is unable promptly to reach an agreement with the owners for the purchase of specific properties to be acquired, he is to form an opinion in consultation with the attorney and the town planner as to the most expedient procedure in respect to each, whether to file a requisition for taking without a previous contract for purchase, or whether to contract to pay the minimum price for which the parcel can be bought, even though in excess of the official appraisal, or whether to abandon the acquirement of the parcel or substitute another. A joint report of the opinion of the negotiator, the attorney, and the town planner on these cases is to be sent to the bureau.

Where the joint opinion of the negotiator, town planner and attorney is in favor of requisitioning a parcel within the tract approved by the bureau, the negotiator will proceed as indicated below.

Where such joint opinion is in favor of purchasing at a higher price than the official appraisal, the negotiator shall so report to the Real Estate Division furnishing evidence that the price proposed to be paid is within the limits of a "just compensation" as permitted by the act. The Real Estate Division will thereupon reconsider the official appraisal in the light of the new evidence and instruct the negotiator whether or not the parcel may be purchased thereunder. The test to be applied in determining just compensation is the fair market value of the land in 1916 (thus eliminating war inflation), plus such increment as may be due to subsequent physical changes or permanent improvements on the land or in the environment, less any permanent depreciation since 1916. In the appraisement of houses, the reproduction cost at the present time should be considered. It is probable that all of the properties purchased by contract will also be requisitioned under the act for the purpose of further assurance of title.

[Sections 7, 8 and 9 refer to technical legal details of procedure for the requisitioning of real estate by right of eminent domain under the special war-time legislation of 1918, and payments for real estate.]



APPENDIX XIV.

INSTRUCTIONS TO FIELD STAFF CONCERNING OPERATIONS.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, UNITED STATES HOUSING CORPORATION, CONSTRUCTION DIVISION.

This manual is to be considered as confidential information to the field office force, and should be so treated and not issued except to those actually interested in the work and under the jurisdiction of this bureau.

The primary aim of these instructions is to insure a correct understanding of the functions of the various employees on the field staff, and their relation to this bureau; also the preliminary development of the project in collaboration with the contractor.

More detailed instructions to the various members of the staff will be issued during the progress of the work, and as occasion will warrant in the future.

I. THE BUREAU ORGANIZATION.

(1) The Bureau of Industrial Housing and Transportation was created by act of Congress approved May 16, 1918, for the purpose of providing houses for workers engaged in war industries.

(2) It functions through the United States Housing Corporation, organized, so far as housing contracts are concerned, as follows:

1. The president.
2. The vice president.
3. The general manager.
4. The manager of Architectural Division.
5. The manager of Engineering Division (Chief Engineer).
6. The manager of Town Planning Division.
7. The manager of Construction Division.

(3) The Construction Division has charge of the award of contracts and has jurisdiction over the field forces who are concerned in the execution of the work; establishes rules and regulations governing their actions and issues instructions concerning operations.

(4) All reports from the field forces are to be sent direct to the construction manager; instructions from the bureau will be transmitted through the construction manager to the works superintendent.

(5) The bureau has authority over the entire work and may suspend or dismiss any or all members of the field organization and appoint successors at any time, should it appear in the judgment of the director that the best interests of the work demand such action.

II. DESIGN ORGANIZATION.

(1) The designing force for a project consists of the architect, the engineer, and the town planner.

(2) They are selected by the bureau, and are responsible to it for the proper design and execution of the whole project, collaborating as a committee during the evolution and perfecting of the scheme.

III. DUTIES OF THE FIELD STAFF.

(1) The duties of the members of the field staff can only be outlined. It is intended in these pages to describe briefly the duties and functions of the principals, with such suggestions for their guidance as may seem pertinent. It is not intended to prescribe hard and fast rules governing all conditions that may arise in the execution of the work. Successful execution depends upon judgment, energy, alertness, and integrity of individuals, and cooperation and teamwork of the whole force, the contractor's as well as our own.

(2) Every member of the field organization is, therefore, required to exert himself to the utmost limits of his ability to discharge the duties imposed upon him and to be a real live, able, and potent factor in the work.

(3) The committee of designers will appoint a works superintendent, subject to the approval of the manager of the construction division.

(4) If it be deemed necessary the bureau will appoint one representative each of the architect's, the engineer's, and the town planner's organizations, who will cooperate with and advise the works superintendent in the field in connection with supervision of the particular work severally allotted to them.

IV. THE ARCHITECT.

(1) The architect or his representative has charge of all construction work covered by the architectural plans and specifications.

(2) He shall cooperate with the town planner and engineer where the work in charge of the latter meets with the work under his supervision.

(3) The directions of the works superintendent as to the proper sequence of work must be carefully followed.

(4) The architect, directly or through his representative in the field, will advise the works superintendent as to the intention of the architectural plans and specifications. He is to be consulted by the works superintendent whenever changes of any consequence seem to be desirable in the architectural plans. If he can not agree with the decision of the works superintendent in any important matter, he may report his dissenting opinion to the manager of the architectural division, who will advise with the construction manager as to the proper policy.

V. THE SUPERVISING ENGINEER.

(1) The engineering force has charge of all the construction work relating to streets, walks, sidewalks, curbs, gutters, sewers, sewage disposal, water, gas, and electricity, and other public improvements and utilities. He will locate and stake out the work on the ground and his field force will supervise the construction of these works under the works superintendent.

(2) In planning the field operations the engineer must arrange his work to tie in with other departments, in order that the whole work may proceed in an orderly manner and without confusion.

(3) The field force of the engineer shall perform their work in such sequence as the works superintendent shall direct.

(4) The engineer, directly or through his representative in the field, will advise the works superintendent as to the intention of the engineering plans and specifications. He is to be consulted by the works superintendent whenever changes of any consequence seem to be desirable in the engineering plans. If he can not agree with the decision of the works superintendent in any important matter he may report his dissenting opinion to the chief engineer, who will advise with the construction manager as to proper policy.

VI. THE TOWN PLANNER.

(1) The town planner supervises the general landscape treatment—fixes the grading of the lots, the grade relations between houses and streets, and, with the architect, the grade relations between houses and grounds, plans for parks and for trees, shrubbery, lawns, etc. In general he coordinates the work of the architect and the engineer.

(2) Since the greater part of his activities are concerned with the general planning of the project, it follows that the results of this planning are in a large measure incorporated in the plans of the architect and the engineer.

(3) The town planner, directly or through his representative in the field, will advise the works superintendent as to the intention of the town planner's plans and specifications. He is to be consulted by the works superintendent whenever changes of any consequence seem to be desirable in the town planner's plans. If he can not agree with the decision of the works superintendent in any important matter, he may report his dissenting opinion to the manager of the town planning division, who will advise with the construction manager as to proper policy.

VII. THE WORKS SUPERINTENDENT.

(1) The works superintendent is the principal executive in the field and is responsible to the bureau in Washington for the successful execution of the work as a whole. As representative of the president, he interprets the contracts and determines policy and methods of procedure; receives instructions from the bureau and transmits them to the contractor and makes reports to the bureau at stated intervals showing progress and costs. He certifies all bills and pay rolls, duly approved by auditor for payment, and must know, before certification, that they are correct and are just and proper charges against the work.

(2) He engages inspectors, and such other assistants as may be required to make sure that all work on the project is properly and efficiently performed, and that all the moneys are wisely expended with the utmost regard to economy consistent with the scope of the project.

(3) He shall assist the auditor in the selection of time and material checkers, making particular efforts to obtain skilled, efficient, and reliable men for this work.

(4) He must coordinate the activities of the several departments under him and bring them into complete harmony; keep in close touch with the contractors; inform himself as to material deliveries; see that the workmen are organized into efficient gangs and make every effort to meet the time schedule and avoid waste.

(5) The works superintendent is under the direct authority of the corporation and reports to the manager of the construction division.

VIII. THE FIELD AUDITOR.

(1) A field auditor will be appointed by the bureau, whose duties will be to audit all pay rolls, invoices, or other indebtedness

for the payment of moneys in connection with the project, to see that they are in order, that the claims are just, and that all the terms and conditions of the original orders or contracts have been fully complied with.

(2) Upon the auditor rests the responsibility of ascertaining that all bills, vouchers, and orders for the payment of money in connection with the work in the field have been properly checked and certified and that they are in order for payment.

(3) He must be thoroughly informed as to the conditions and requirements of all contracts and agreements relating to the work, and must keep himself posted on all modifications of same.

(4) He must maintain his books and records continually up to date; each day all matters pertaining to the business of the preceding day must be duly approved and entered in the record.

(5) Bills of the contractors and vendors must be promptly audited and passed for payment.

(6) Time and material checkers report to the auditor; he must see to it that they discharge their duties promptly and efficiently.

(7) The auditor shall have access to all the records of the contractor relating to the work and shall establish such regulations as may be necessary for the proper checking and verifying of the contractor's accounts.

(8) He shall establish such regulations as may be necessary to secure proper records of all expenses incurred; to prevent undue extravagance; and to insure the utmost economy compatible with the urgency of the work.

(9) He must cooperate with the cost reports engineer by giving him all required information concerning costs.

IX. COST REPORTS ENGINEER.

The duties of the cost reports engineer consist of:

1. Ascertaining labor costs as applied to the units of materials used.
2. Keeping records of progress.

These duties require accuracy, concentration, and speed; the records must be continually up to date and must be transmitted to the bureau at stated intervals or whenever required.

Cost.—The bureau has prepared an official estimate of the labor cost of the project and also of the material costs. The compilation of actual costs must be made on exactly the same basis as this estimate, in order to make possible a comparison between estimated and actual costs. It is incumbent upon the cost reports engineer to adhere strictly to the requirements of the estimate sheets and not deviate in the slightest degree from them. Material costs are determined by the bureau from the contractors' requisitions, but the labor costs and labor distribution must be ascertained and fixed by the cost reports engineer in the field and given to the works superintendent who will send a copy to the bureau for further analysis. The works superintendent requires this information at first hand and at frequent intervals to enable him to judge how his cost is running.

Progress.—The bureau has prepared a chart showing the different stages of completion of the several parts of the project and the estimated dates on which these stages must be completed in order to complete the entire project within the specified time. The cost reports engineer must keep an accurate record of the actual progress of the work in such shape as to be easily comparable with the estimate chart, in order that the works superintendent may always know how near to schedule the job is running.

X.

Disbursing agent.—A disbursing agent will be appointed by the bureau for each project, whose duties will be to make payment for all bills, vouchers, and orders after they have been properly audited and certified.

Corporation representative.—A corporation representative appointed by the bureau will be stationed on each project, whose function it will be to observe the progress of the work and report his findings to the construction manager.

He has no executive authority of any kind, but he shall have access to all divisions of the organization and shall receive from any source within the field organization of the contractor or the corporation such information as he may desire for the purpose of making reports.

He will confer with the contractor and with the works superintendent concerning methods of procedure, and may offer advice when required, using his best efforts to promote harmony of action and speed and efficiency in execution, without, however, relieving the contractor or the works superintendent of their respective responsibilities.

Traveling supervisors.—The bureau may appoint such traveling supervisors, traveling cost engineers, and traveling auditors as may be required to properly tie this bureau and field organizations; and may vest them with such authorities as may seem desirable in the circumstances.

XI.

Inspectors.—Inspectors will be engaged by the works superintendent and by the engineer to see that the contractor conforms to the requirements of the plans and specifications. They will inspect and pass upon the work as it is placed, see that efficient tests are made at the proper times, and report their findings to the superintendent.

They will also keep accurate records of the progress of the work under their jurisdiction and report same to the cost reports engineer for charting.

Checkers.—The auditor will engage such assistants as may be required for the purpose of checking the contractor's timekeeping and materials forces. It is not intended that these checkers shall duplicate the similar forces employed by the contractor, but they must be so organized as to insure against errors and satisfy the works superintendent that pay rolls and bills as rendered are just and correct.

XII. THE GENERAL CONTRACTOR'S ORGANIZATION.

(1) The general contractor will place in the field a complete operative force capable of carrying out all of the work within the scope of his contract. He shall place at the head of this force a responsible member of his organization who shall direct all the work pertaining to the contract and who shall receive instructions from and report to the works superintendent.

(2) The contractor shall employ such estimators, traffic men, expeditors, and material men as may be necessary for the purchase of and securing the delivery of materials; and such superintendents, engineers, foremen, timekeepers, and workmen both skilled and common, as may be required in the performance of the work. He may sublet such work as may seem desirable, but no subcontracts shall be made without first obtaining the consent and approval of the bureau.

(3) The contractor shall purchase all materials required and see to its delivery and shall verify the bills and deliver them to the works superintendent for certification and payment.

(4) The contractor shall employ all labor required, conditional upon the works superintendent's approval; shall pay all pay rolls and deliver them to the works superintendent for certification.

(5) The contractor's organization will work in harmony with that of the works superintendent, and will comply with all instructions issued by the works superintendent relating to the work.

(6) The methods of inspection, timekeeping, and accounting must conform to the requirements of the bureau and the forms issued by the bureau must in all cases be used.

(7) No bills for materials shall be paid until they have been duly passed by the auditor.

XIII. PLANNING THE WORK.

(1) As soon as the contract for the work is let, the works superintendent, the contractor, and a bureau representative shall make a careful, detailed plan of the work to be performed—listing in detail all the materials required, where and how to be purchased; determine the sequence of deliveries and the daily requirements for each kind of material; determine the storage requirements, track-age facilities and all things necessary in connection with materials and their delivery at site ready for use.

(2) They shall also fix and determine the labor requirements to put the materials in place when they are received.

(3) The number of men required in the different trades, where to get them and accommodations for them at or near the work. If bunk houses and commissary are needed, provision for same must be made, together with maintenance, sanitation, etc.

(4) Investigate the hospital facilities at or near the site through the medical section of the Council of National Defense, and make such provision as may be necessary to utilize local facilities. Should it be necessary to provide a temporary hospital the necessary arrangements should be done at once with the sanction of the medical section above named.

(5) The proper study of the above requirements resolves itself into the making of three definite schedules, viz: (1) Of materials; (2) of deliveries; (3) of time.

(6) The facilities for delivery and distribution of materials are matters of great moment. It, therefore, becomes necessary to make a thorough investigation of this matter and determine exactly how much material can be handled daily and how it can best be distributed on the work. This involves the matter of railroad sidings and spurs and the number of cars that can be accommodated; the trucking distance to the work and the number of teams and trucks required for hauling; the location, size, and extent of store-houses required; and the building of temporary roads.

(7) *Material schedule.*—The material schedules must be made up in detail covering the whole operation, in such order that the requirements committee can determine where materials can best be purchased.

This schedule must be further broken up to show the sequence in which the various materials will be required on the work, so that the vendors will ship material for which there is immediate need at the time needed, in order to maintain time schedule.

Schedule must also show all items reduced to carload lots in order to adjust and determine car service and transportation.

(8) *Delivery schedule.*—The delivery schedule must be made up with a due regard to the distance of the shipping point from the project and the time required for preparation and fabrication of materials—and must be nicely adjusted and balanced with the time required for erection.

Copies of these schedules will be given to the purchasing, priorities, and traffic departments of the bureau, and these departments will, when required, cooperate with the contractor and arrange through the various governmental bodies having jurisdiction such details as are necessary to enable the contractor to secure the purchase and dispatch of materials.

(9) *Time schedule.*—In laying out time schedules bear in mind that the horizontal dimensions of a job have comparatively little influence on time, it being merely necessary to employ more men and materials as the area of the project increases.

In order to determine accurately the time required to finish a project, it becomes necessary to subdivide it into groups and operations and then to break down each operation into the number

of men and the amount and kind of material involved, where and how it coordinates with the other operations that precede or follow it, and then adjust the time in the schedule. Remember that in order to deliver the project on time it is absolutely necessary to supply plans, materials, and labor to the job at such periods as will anticipate the start of each operation.

The time schedule, therefore, resolves itself into a definite program which fixes the date of starting and completing each part of the job, tying in with the date on which each kind of material necessary for the work must be delivered at the job.

It is important to remember that the subcontractors are also subject to the program and that, therefore, they must schedule all of their operations, both as regards labor and materials, and definitely fix the time of starting and completion and the date for mate-

rials deliveries, to coordinate exactly with the general time schedule.

When this schedule has been determined and fixed, it must be taken as absolute law by the contractor and his subs and by the field organization, and all things necessary for its accomplishment must be done at the appointed time.

(10) It is suggested that the houses be started in groups of convenient size, say 50 houses per group, preferably according to type, and each group have its trade organizations with its work so designed and balanced that there will at all times be work ahead for each gang of workmen.

(11) Nonperishable materials should be distributed direct from the cars to the building sites. Cement, lime, etc., should be stored in sheds alongside the tracks and distributed as required.



APPENDIX XV.

CONTRACT FOR GENERAL CONSTRUCTION WORK.

DEPARTMENT OF LABOR.

BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION, UNITED STATES HOUSING CORPORATION, LEGAL DIVISION.

THIS CONTRACT made and concluded this day of
19 .., by and between
(name and address of contractor; and if corporation, state place
of incorporation and address), party of the first part (hereinafter
called the Contractor), and the United States Housing Corporation
(hereinafter called the Owner); acting by authority of the Presi-
dent and the Secretary of Labor, party of the second part,
Witnesseth:

Whereas the President, by Executive order dated June 18, 1918,
directed that "the Secretary of Labor shall have and exercise all
power and authority vested in me by the act of Congress entitled
'An act to authorize the President to provide housing for war
needs,' approved May 16, 1918, and the act of Congress entitled
'An act making appropriations to supply additional urgent defi-
ciencies in appropriations for the fiscal year ending June 30, 1918,
on account of war expenses and for other purposes,' approved
June 4, 1918, in so far as the same relates to 'Housing for War
Needs,'" and the said United States Housing Corporation having
been created pursuant to said acts and said authority; and

Whereas proposals were asked from and submitted by responsible
competing contractors for the work herein mentioned, and the bid
of the above Contractor was thereupon duly accepted in accordance
with law, and a formal contract is to be entered into in accordance
with such acceptance; and

Whereas the Contractor has had experience in the execution of
similar work, has an organization suitable for the performance of
such work, and is ready to undertake the same upon the terms and
conditions herein provided; and

Whereas the Owner, wherever necessary, has engaged an archi-
tect, engineer, and town planner, to furnish designs, engineering
services, and town planning and all necessary details required for
the proper execution of the work herein contracted for;

Now, therefore, in consideration of the premises and of the pay-
ments to be made as hereinafter provided, the Contractor hereby
covenants and agrees with the Owner to do and perform all the work
herein enumerated, within the time agreed upon; to furnish such
labor, materials, tools, machinery, equipment, facilities, and
supplies as may be necessary and covered by this agreement; to
do all things necessary and in accordance with the drawings and
specifications enumerated herein, which form a part of and the
basis of this contract, and which are fully numbered, described, and
identified herein; to accept and abide by the following terms and
provisions of this contract, and to do all things necessary for the
completion of the following described work, to wit:

Work to be done.—"A." The work to be done by the Contractor
is as follows.

Location.—"B." The location of the project is.

Plans, drawings, etc.—"C." The plans, drawings, and specifica-
tions are made by.

"D." The plans, drawings, specifications, and addenda thereto
are.

Cost of work.—"E." The estimated cost of the work, including
plant rental, Contractor's fee, and overhead expenses is.

Plant rental.—"F." The plant rental agreed upon is.

Contractor's fee.—"G." The Contractor's fee, subject to the
provisions of Article V, shall be.

Time.—"H." The time within which the work contracted for
herein shall be completed is.

Bond.—"I." The bond required of the Contractor shall be in the
sum of.

Work to be done by Contractor.—"K." The work which the Con-
tractor shall do with Contractor's own forces consists of.

Work to be sublet.—"L." The work which the Contractor shall
sublet consists of.

"M." Further requirements.

Schedule A. Detailed list of minimum plant equipment which
the contractor agrees to furnish.

Schedule B. Number, position, and salary of members of con-
tractor's field force.

The terms and conditions of this contract are as follows:

ARTICLE I. *Title to work—Subcontracts—Changes in specifica-
tions.*—Title to all work completed or in course of completion, shall
be in the Owner; and the Contractor agrees to execute the work
contracted for with the Contractor's own forces, except such por-
tions as the Contractor undertakes to sublet. Any portion of the
work under this contract so sublet, shall be in accordance with
Article III, and if on a fee basis, the fee of the subcontractor shall
include the salary of a resident superintendent who shall be main-
tained on the work at all times until the completion thereof; the
furnishing and maintenance of all plant equipment and tools; the
services of the subcontractor and all expenses of his home office;
and shall be based in all respects on the requirements of Article II.

It is understood and agreed that the drawings and specifications
are not complete, and that completed drawings and specifications
will be made by the architect, engineer, or town planner from time
to time during the progress of the work herein.

The Owner, by written instructions or drawings issued to the
Contractor, may make changes in said drawings or specifications,
issue additional instructions, drawings, and specifications, require
additional work, or direct the omission of work previously ordered;
and the provisions of this contract shall apply to all such changes,
modifications, and additions with the same effect as if they were
embodied in the original drawings and specifications. The Con-
tractor shall comply with all such instructions, drawings, and
specifications.

ARTICLE II. *Plant equipment.*—The Contractor shall furnish all
plant equipment, which shall include all machinery, appliances,
wheel and road scrapers, and tools of every description that may be

required for the speedy and efficient execution of the work, and shall at his own expense, maintain same in a high state of efficiency for the duration of the work. Teams, wagons, and motor vehicles shall not be considered as plant equipment. All materials and labor which do not enter into the permanent work shall be considered as plant equipment, except as otherwise provided in the specifications above mentioned or in a schedule hereto attached.

The Contractor shall pay all costs for transporting, loading, unloading, and handling said plant equipment and all upkeep and maintenance charges, fuel, oil, etc.

The necessary labor charges for the operation of machinery, boilers, etc., shall be considered as part of the cost of the work.

Upon completion of the work and when directed so to do, the Contractor shall remove from the site at his own expense all plant equipment furnished by the Contractor.

Plant rental.—The Contractor agrees to accept a fixed price as rental for the use of all the plant equipment required in the execution of the branches of the work which will be done with his own forces and as stated under "F," page 2 hereof, which shall be payable in installments as the work progresses. The minimum of equipment which the Contractor will furnish is shown on Schedule A filed herewith, and the Contractor agrees to furnish such additional plant equipment as the work may require, or which he may be directed to furnish, without further compensation.

Teams and trucking.—The Contractor shall furnish all drivers, chauffeurs, teams of horses and wagons and all motor trucks that may be required on the work for the purpose of hauling and distributing materials or for the transportation of employees. The Contractor shall be paid the net amount of the hire or employment thereof; provided, however, that where the Contractor furnishes his own teams, wagons, and motor trucks, he shall be paid the prevailing rate for same. The number, character, and cost of such vehicles to be employed shall be subject to the approval of the Owner.

ARTICLE III. *Material, labor, and subcontracts.*—All materials shall be purchased by the Contractor upon orders submitted to and approved by the Owner. All such purchases shall be in conformity with the rules and regulations of the War Industries Board or other body or bodies authorized by the Federal Government and having competent jurisdiction.

The Owner will, so far as the Owner may deem wise, cooperate with the Contractor in the purchase of materials required in the work, in the allocation of same, in the securing of priority certificates, and also in securing car service and routings and in the expediting of shipments. The Contractor, however, will be held responsible for the delivery of material, and must employ the necessary traffic men for this purpose.

All listing of materials and planning of the operation of the work shall be done by the Contractor prior to the organization of the field forces, and shall be submitted to the Owner for approval. The expenses in connection with this and other initial work, however, shall be paid by the Contractor, and for such expenses the Contractor shall not be entitled to any reimbursement.

The Contractor will furnish and provide all labor, skilled and common, as may be required for the execution of the work, subject to the approval of the Owner. The Contractor shall make no departure from the standard rate of wages being paid in the locality where said work is being done without the prior consent and approval of the Owner, and shall not attempt to secure labor at the expense of other Government work; and shall otherwise comply with Articles XIV, XV, and XVI hereof.

The Contractor shall make such subcontracts as the Contractor may deem necessary for work which can not be executed profitably or expeditiously by the Contractor's own organization. In making such subcontracts, however, the approval of the Owner shall first be obtained, and said subcontracts shall contain the provisions

prescribed by (e), (f), (j), and (k) of Article IX hereof, and be subject to the provisions of Articles XIV, XV, and XVI hereof.

ARTICLE IV. *Cost of the work—Reimbursement of Contractor.*—The Owner shall make payments in the manner hereinafter described in Article VII for such of the Contractor's actual net expenditures or obligations incurred in the performance of said work as may be approved or ratified by the Owner, and as are included in the following:

- (a) All materials purchased for permanent use and incorporation in the work, including exceptions to plant equipment as mentioned in specifications for this work, or in an attached schedule, and including the transportation charges thereon.
- (b) All labor employed on the work, except for handling, maintenance, etc., of plant equipment provided for in Article II.
- (c) All payments made to subcontractors in accordance with the provisions of this contract.
- (d) Transportation and expenses to and from the work of the necessary field forces for the economical and expeditious prosecution thereof; procuring labor, and expediting the production and transportation of material; said expenses not to exceed the amount, if any, prescribed by law. But no such expenses shall be incurred without first securing the consent in writing of the Owner.
- (e) Salaries of engineers, assistant superintendents, foremen, timekeepers, material men, and other employees at the field offices of the Contractor in connection with said work and in accordance with Schedule B attached hereto. In case the full time of any field employee of the Contractor is not applied to said work but is divided between said work and other work, his salary shall be included in this item only in proportion to the actual time applied to this work. No increase in the salaries of the field forces shall be made without the approval of the Owner.
- (f) Buildings and equipment required for necessary field offices, storehouses, commissary, and hospital, not a part of or included in plant equipment and the necessary cost of maintaining and operating same.
- (g) Permit fees, deposits, royalties, and other similar items of expense incidental to the execution of this contract and necessarily incurred; all to be subject to the approval of the Owner.
- (h) Such bonds, public liability, workmen's compensation, and other insurance as the Owner may require or approve, and such losses and expenses, not compensated by insurance or otherwise as are found by the Owner to have been actually sustained by the Contractor in connection with said work, and including settlements made with the consent and approval of the Owner.
- (i) Such other items as in the opinion of the Owner should properly be borne by the Owner.

The Contractor shall not be reimbursed for expenses incurred in conducting Contractor's main office or regularly established branch office, for salaries of the Contractor's executive offices, or for any other overhead expense of any kind. Neither shall the Contractor be reimbursed for the salary or living expenses of the Contractor's representative on the work who shall act as chief superintendent and who shall receive and execute instructions issued by the Owner.

The Contractor shall take advantage to the extent of the Contractor's ability of all discounts available. The Contractor shall transmit to the Owner all bills for supplies and materials incurred

by the Contractor in ample time to enable the Owner to take advantage of such discounts as may be available.

All revenue from the operations of the commissary, hospital, or other facilities, and from rebates, rents, refunds, sale of temporary buildings, etc., shall be accounted for by the Contractor and applied in reduction of the cost of the work.

The Contractor shall assume responsibility for the proper and correct installation of all materials required in the works.

All costs for labor and materials incurred in rectifying errors due to carelessness or incompetency of the Contractor, or of the Contractor's employees or subcontractors, shall be paid by the Contractor, and he shall not be reimbursed for same.

ARTICLE V. Contractor's fee.—The Owner agrees to pay and the Contractor agrees to accept in full payment for services as Contractor in the execution of this work the sum stated under "G" page 2 hereof. This fee is based on the amount of work described herein and in the drawings mentioned herein. One-half thereof shall be due and payable as the work progresses, and the remainder shall not be considered as earned until the completion of all of the work required by this contract.

If the Owner shall materially increase or decrease the work so described by reason of additions, changes, or modifications, then the fee of the Contractor shall be accordingly increased or decreased by the Owner on the basis of the relation of the above fixed fee to the work so described, or on a basis as determined by the Owner, and in accordance with the requirements of the act of Congress of May 16, 1918, governing this work.

In the event that the Contractor, by reason of skill in executive management and organizing ability, shall reduce the total cost of the work below the estimated cost stated under "E" page 2 hereof then the Contractor shall receive in addition to the sum herein provided a proportion of the savings thus effected equal to one-fourth ($\frac{1}{4}$) of the amount of such savings, such additional fee, however, not to exceed in amount one-half ($\frac{1}{2}$) of the fee mentioned in "G" above: *Provided, however,* That if the completion of the whole work is delayed beyond the completion date provided in this agreement, then the Contractor shall not receive any such additional fee unless it can be clearly established to the satisfaction of the Owner that said delay was due to conditions beyond the control of the Contractor and not preventable by any action of the Contractor; but all claims arising from such delay shall be made at the time such delay occurs.

In the event that the total cost exceeds the estimated cost, there shall be deducted from the Contractor's fee one-fourth ($\frac{1}{4}$) of the amount of such excess cost, such deduction, however, not to exceed in amount one-half ($\frac{1}{2}$) of the Contractor's fee stated in "G" above. If, however, the Owner is satisfied that the excess cost over said estimate was due to no negligence or mismanagement on the part of the Contractor, but to conditions later arising and beyond the power of control or of prevention by the Contractor, the Owner may remit said deduction or any part thereof.

But no payment made or withheld under this article shall affect or prejudice any right which the Owner may have under the bond required by Article XIII hereof.

ARTICLE VI. Time of completion.—It is mutually understood and agreed that time is of the essence of this contract, and that the whole of this work shall be completed ready for use as stated under "H" above. Any delay in the completion of the contract beyond said time shall be considered a breach thereof, unless it shall clearly appear to the satisfaction of the Owner that such delay was due to conditions beyond the control of the Contractor and in no wise preventable by any action of the Contractor.

ARTICLE VII. Payments by owner.—The Owner will maintain at the work a works superintendent, an auditor, and a disbursing agent, and will pay direct upon proper audit and certification:

(a) To the vendors for all materials received and accepted.

- (b) All subcontractors under contracts made in accordance with the provisions of this agreement.
- (c) Monthly payments to the Contractor for the use of plant, based upon the percentage of work completed on the last day of the preceding month, as provided in Article II and as determined by the Owner.
- (d) Monthly payments to the Contractor for services as provided in Article V, and to the subcontractor, where the subcontract so provides, based upon the percentage of work completed on the last day of the preceding month, and as determined by the Owner.
- (e) Such general and specific expenses of the Contractor not included in the above, but which are clearly chargeable to the cost of the work as provided in Article IV.
- (f) For net hire of teams of horses and wagons and motor trucks as provided in Article II of this Contract.

The Contractor will pay all wages on labor pay rolls when they become due, and will be reimbursed by the Owner when pay rolls are duly certified to and verified by the Owner. Thirty days after final completion and acceptance of the work the Owner shall pay the Contractor the unpaid balance due the Contractor, and upon satisfactory evidence that the Contractor has fulfilled all obligations up to said time.

ARTICLE VIII. Inspection and audit.—The Owner shall at all times be afforded proper facilities for inspection of the work and shall at all times have access to the premises, to the work and material, and to all books, records, correspondence, instructions, plans, drawings, receipts, vouchers, and memoranda of every description of the Contractor pertaining to said work; and the Contractor shall preserve for said purpose for a period of two years after the completion or cessation of work under this contract, all the books, records, and other papers above mentioned. Any duly authorized representative of the Contractor shall be accorded the privilege of examining the books, records, and papers of the Owner relating to said work for the purpose of checking up and verifying the cost of said work. The forms and system of accounting to be employed by the Contractor shall be such as are satisfactory to the Owner. All machinery, equipment, material, supplies and the like used in the performance of or furnished under this contract, and construction of facilities, equipment, machinery, and tools of the Contractor and all workmanship shall be at all times subject to inspection by the Owner, and the Contractor shall furnish reasonable facilities and assistance for all such inspection, and whatever of such buildings, facilities, machinery, tools, and equipment, apparatus, lighting, heating, and ventilating apparatus, piping, etc., does not in all respects fulfill the requirements of this contract shall be rejected, and the decision of the Owner as to such facts shall be final. The Contractor agrees to immediately replace at his own expense all materials and the articles so rejected.

ARTICLE IX. Special requirements.—The Contractor hereby agrees—

- (a) To begin the work herein specified at the earliest time practicable, and diligently proceed so that such work may be completed at the earliest possible date.
- (b) To promptly pay for all labor or other service rendered.
- (c) To procure and thereafter maintain such insurance in such forms and in such amounts and for such periods of time as the Owner may approve or require.
- (d) To procure all necessary permits and licenses, and obey and abide by all laws, regulations, ordinances, and other rules applying to such work, of the United States of America, of the State or Territory wherein such work is done, of any subdivision thereof, and of any other duly constituted public authority.
- (e) Unless this provision is waived by the Owner, to insert in every contract made for the furnishing to the Contractor,

of services, materials, or supplies, for the purpose of the work hereunder, a provision that such contract is assignable to the Owner; will make such contracts in the Contractor's own name, and will not bind or purport to bind the Owner.

- (f) In every subcontract made in accordance with the provisions hereof, to require the subcontractor to agree to comply fully with all the undertakings and obligations of the Contractor herein, excepting such as do not apply to such subcontractor's work.
- (g) At all times to keep at the site of the work a duly appointed representative who shall receive and execute on the part of the Contractor such notices, directions, and instructions as the Owner may desire to give.
- (h) At all times to use the best efforts in all acts hereunder to protect and subserve the interest of the Owner.
- (i) To make good any defects of construction or materials which may develop within one year from the date of completion of the work, the actual net cost of labor and materials only to be paid by the Owner. No default of inspection or supervision on the part of the Owner shall relieve the Contractor from the obligation to furnish materials and workmanship of the kind and quality specified.
- (j) To waive all liens for labor or materials and insert a similar waiver in all subcontracts; and further not to create, record, file, or cause to be created, recorded, or filed, any lien, mortgage, attachment, order, or other encumbrance against the aforesaid premises, or the improvements erected or intended to be erected thereon; the Contractor to be responsible for any lien, attachment, order, or other encumbrance so filed or created on account of any claim against said Contractor or any subcontractor. The Owner, however, reserves the right to relieve the said Contractor of the obligation under this clause in so far as it applies to liens other than those which might be created by the Contractor upon the furnishing of a sufficient bond by the Contractor, in addition to the bond required by Article XIII, and such other security as the Owner may require. But nothing herein is to be construed as an admission that the property of the Owner may be at any time subject to any liens or claims whatsoever.
- (k) To take such precautions as may be necessary to prevent the start and spread of fires in the works in which the Contractor is engaged under this contract. Rules and regulations shall be established and maintained prohibiting smoking and the lighting of fires in the vicinity of combustible material, and prohibiting the accumulation of waste, shavings, oily rags, and such other material as may cause or accelerate the spread of fire. Storehouses, material sheds, workshops, and lumber yards shall be supplied with fire-extinguishing apparatus of approved type and in such quantity as may be required. All regulations in regard to fire prevention shall be subject to the approval of the Owner.
- (l) To furnish as and when required by the Owner a list showing the names of all persons employed in any capacity to aid in carrying out the provisions of this contract by the Contractor, the service rendered by each and the amount of compensation.

ARTICLE X. *Right to terminate contract.*—Should the contractor at any time refuse, neglect, or fail in any respect to prosecute the work with promptness and diligence, or in a manner satisfactory to the Owner, or default in the performance of any of the agreements herein contained, the Owner may, at the Owner's option, after five days' written notice to the Contractor, terminate this contract, and may enter upon the premises and take possession, for the purpose of com-

pleting said work, of all materials, tools, equipment, and appliances, and all options, privileges, and rights, and may complete or employ any other person or persons to complete said work. The Contractor shall be paid for said plant equipment in accordance with Article II, less the cost of maintenance and repair thereof. Upon the completion of said work and when so notified by the Owner, the Contractor shall remove, at the Contractor's own expense, said equipment, and upon failure to do so after ten days' notice, the Owner shall have the right to dispose of the same at public or private sale and to turn over the proceeds thereof to the Contractor. In case of such termination of the contract, the Owner shall pay to the Contractor such amounts of money on account of the unpaid balance of the cost of the work and of the fee as will result in fully reimbursing the Contractor for the cost of the work and the proportion of the fee earned up to time of such termination. The Contractor hereby agrees that the judgment of the Owner as to the amount of such fee, cost, and plant rental shall be final, and that such payments when made shall constitute full settlement of all claims of the Contractor against the Owner for money claimed to be due to the Contractor for any reason whatsoever. In case of such termination of the contract the Owner shall further assume and become liable for all such obligations, commitments, and unliquidated claims as the Contractor may have theretofore in good faith undertaken or incurred in connection with said work, and the Contractor shall, as a condition of receiving the payments mentioned in this article, execute and deliver all such papers and take all such steps as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor under such obligations or commitments. When the Owner shall have performed the duties incumbent upon the Owner under the provisions of this article, the Owner shall thereafter be entirely released and discharged of and from any and all demands, actions, or claims of any kind on the part of the Contractor hereunder or on account hereof.

ARTICLE XI. *Abandonment of work by the Owner.*—If conditions should arise which in the opinion of the Owner, make it advisable or necessary to cease work under this contract, the Owner may abandon the work and terminate this contract. In such case the Owner shall assume and become liable for all such obligations, commitments, and unliquidated claims as the Contractor may have theretofore, in good faith, undertaken or incurred in connection with said work; and the Contractor shall, as a condition of receiving the payments mentioned in this article, execute and deliver all such papers, and take all such steps as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor under such obligations or commitments. The Owner shall pay to the Contractor on such abandonment such an amount of money on account of the unpaid balance of the cost of the work and of the fee and for the plant equipment as will result in the Contractor receiving full reimbursement for the cost of the work, a proper proportion of the whole fee specified in Article V and "G" above, and of the rental of the plant equipment, specified in Article II and "F" above. When the Owner shall have performed the duties incumbent upon the Owner under the provisions of this article, the Owner shall thereafter be entirely released and discharged of and from any and all demands, actions, or claims of any kind on the part of the Contractor hereunder or on account hereof.

ARTICLE XII. *Indemnification of Owner and protection of persons and property.*—To the extent of liability insurance authorized by the Owner, the Contractor undertakes to indemnify and save harmless the Owner, and for and on account of the Owner to make defense against all claims for damages to persons or to property alleged by claimants to have been caused through the negligent performance of any part of the work herein, whether such default be asserted to have been by the Contractor or by a subcontractor,

or to have been in the performance of a duty to employees, to owners of property, or to members of the public. The Contractor shall maintain adequate protection of all of the Contractor's property and work, and of the property of the Owner involved in or under this contract; and shall further see that all necessary precautions are taken for the protection of adjoining property, sidewalks, curbs, streets, etc., and of all persons lawfully on or near said property. The Contractor further agrees to hold the Owner or the Owner's officers, agents, or employees harmless against any claim for any violation or infringement by the Contractor or any subcontractor of any letters patent in the course of any work done or material furnished hereunder.

ARTICLE XIII. *Bond.*—The Contractor shall prior to commencing the said work furnish a bond, with sureties satisfactory at all times to the Owner in the amount as stated under "I" page 2 above, conditioned upon the full and faithful performance of all the terms, conditions, and provisions of this contract by the Contractor and upon the prompt payment by the Contractor of all bills for labor, material, or other service furnished to the Contractor in so far as this contract so requires, and the satisfaction of all liens or charges against the property or claims against the Owner arising through any act or omission of the Contractor or of any subcontractor or employee of the Contractor. Before final payment under this contract shall be made to the Contractor, he shall execute and deliver to the Owner a certificate, duly verified, stating that no liens or claims exist by reason of any work performed under this contract which may be chargeable to the Owner and that all financial obligations on the part of the Contractor and arising out of the work performed hereunder have been satisfied.

ARTICLE XIV. *Laws and restrictions relative to labor.*—All work required in carrying out this contract shall be performed in full compliance with the laws of the State, Territory, or District where such labor is performed: *Provided*, That the Contractor shall not employ in the performance of this contract any minor under the age of 14 years or permit any minor between the ages of 14 and 16 years to work more than eight hours in any one day, more than six days in any one week, or before 6 a. m. or after 7 p. m. Nor shall the Contractor directly or indirectly employ any person undergoing sentence of imprisonment at hard labor which may have been imposed by a court of any State, Territory, or municipality having criminal jurisdiction: *Provided, however*, That the President of the United States may by Executive order, modify this provision with respect to the employment of convict labor and provide the terms and conditions upon which such labor may be employed. This provision shall be of the essence of the contract.

ARTICLE XV. *Eight-hour basic day; time and one-half for overtime; damages for violation.*—Wages of laborers, operatives, and mechanics, doing any part of the work contemplated by this contract, in the employ of the Contractor, shall be computed upon a basic day rate of eight hours' work, with overtime rates to be paid for at not less than time and one-half for all hours in excess of eight hours. Compliance by the Contractor with the provisions of the article shall be of the essence of the contract.

ARTICLE XVI. *Labor disputes.*—In the event that labor disputes shall arise directly affecting the performance of this contract, and causing or likely to cause any delay in making the deliveries, the Secretary of Labor may settle or cause to be settled such disputes, and the parties hereto agree to accede to and to comply with all the terms of such settlement. If the Contractor is thereby required to pay labor costs higher than those prevailing in the performance of this contract immediately prior to such settlement, the Secretary of Labor or his representative, in making such settlement and as a part thereof may direct that a fair and just addition to the estimated cost in Article V shall be made therefor; but if such settlement reduces such labor costs to the Contractor, the Secretary of Labor or his representative may direct that a fair and just deduction be

made from the said estimate. No claim for addition shall be made, unless the increase was ordered in writing by the Secretary of Labor or his duly authorized representative, and such addition to the estimate was directed as part of the settlement. Every decision or determination made under this article by the Secretary of Labor or his duly authorized representative shall be final and binding upon the parties hereto. Compliance with the provisions of this article shall be of the essence of this contract.

ARTICLE XVII. *Nonparticipation of officials.*—It is hereby agreed that no member of or Delegate to Congress or Resident Commissioner, nor any officer or employee of the United States, is or shall be admitted, directly or indirectly, to any share or part of this contract, or to any benefit that might arise therefrom; but this article shall not apply to this contract so far as this contract may be within the operation or exception of section 116 of the act of Congress approved March 4, 1909 (35 Stat., 1109), or of section 1 of the housing act above mentioned.

ARTICLE XVIII. *Right to transfer.*—Neither this contract nor any interest therein shall be assigned or transferred by the Contractor. (See sec. 3737, R. S., U. S.)

ARTICLE XIX. *Settlement of disputes.*—This contract shall be interpreted as a whole, and the intent of the whole instrument, rather than the interpretation of any special clause, shall govern. If any doubts or disputes shall arise as to the meaning or interpretation of anything in this contract, the Owner's decision shall govern, and if the Contractor shall consider itself (himself) prejudiced by any decision of the Owner made under any provision hereof, the Contractor shall have the right to submit the same to the Secretary of Labor, whose decision shall be final and binding upon both parties hereto. But said reference shall be taken within fifteen days after said decision of the Owner.

ARTICLE XX. *Owner's control of work.*—The Contractor shall, in the performance of this contract, comply with and be bound by all directions, instructions, and decisions of the owner or of the Owner's authorized representative, who shall have general supervision and control of the work; and compliance by the Contractor with any such directions, instructions, or decisions shall be a justification of and protection to the Contractor for any action so taken. The Owner shall have the right to suspend or dismiss any of the Contractor's assistants or employees in said work at any time, should the Owner deem it to be to the best interest of the work or of the Owner so to do.

ARTICLE XXI. *Warranty against commissions.*—The Contractor expressly warrants that the Contractor has employed no third person to solicit or obtain this contract or to cause or procure the same to be obtained upon compensation in any way contingent in whole or in part upon such procurement; and that the Contractor has not paid or promised or agreed to pay to any third person in consideration of such procurement or in compensation for services in connection therewith any brokerage, commission, or percentage upon the amount receivable by the Contractor hereunder; and that the Contractor has not, in estimating or fixing the contract price herein, included any sum by reason of any such brokerage, commission, or percentage; and that all moneys payable to the Contractor hereunder are free from obligation to any other person for services rendered, or supposed to have been rendered, in the procurement of this contract. The Contractor further agrees that any breach of this warranty shall constitute adequate cause for the annulment of this contract by the Owner, and that the Owner may retain from any sums due or to become due hereunder an amount equal to any brokerage, commission, or percentage so paid or agreed to be paid.

ARTICLE XXII. *Inurement and definition.*—This contract shall bind and inure to the Contractor and its (his) successors. It is understood and agreed that wherever the word "Owner" is used herein, the same shall be construed to include the Director of the

Bureau of Industrial Housing and Transportation in his official capacity, or his duly appointed representatives or successor in office, or any agency which may be designated or created to carry out the provisions of the housing act above mentioned, and this contract may be formally assigned to such agency.

Witness the hands of the parties hereto the day and year first above written, all in triplicate.

WITNESSES:

(1)
(2) By

ATTEST:

UNITED STATES HOUSING
CORPORATION,

..... By
Secretary. *President.*
APPROVED: APPROVED AS TO FORM BY:
.....
Manager Construction *Legal Division.*
Division.

BOND.

Know all men by these presents, That we,
(a corporation organized and existing under the laws of
..... of the city of and State of
..... principal, and (a corporation
organized and existing under the laws of)
surety, are held and firmly bound unto the United States Housing
Corporation in the penal sum of dollars, law-
ful money of the United States, for the payment of which, well
and truly to be made to the United States Housing Corporation,
we bind ourselves, our heirs, executors, administrators, successors,
and assigns, jointly and severally, firmly by these presents.

The condition of the above obligation is such, That whereas the
said principal has entered into a certain contract, hereto attached,
with the United States Housing Corporation (therein called the
Owner) dated, now, If the said principal
shall well and truly perform and fulfill all the undertakings, cove-
nants, terms, conditions, and so forth, of said contract during the
original term of said contract or any extension of said term which
may be granted on the part of said owner without notice to said
surety, or during the life of any guaranty required under said
contract; and shall also well and truly perform and fulfill all the

undertakings, terms, conditions, and so forth, of any and all duly
authorized modifications of said contract which may hereafter be
made, notice of which modifications to said surety being hereby
waived; and shall promptly make payment, as and when required
by said contract, to all persons supplying labor, materials, or other
service in the prosecution of the work provided for in said contract
and any such authorized extension or modification thereof, and
shall satisfy all liens or charges against the property, or claims
against the Owner arising through any act or omission of the Con-
tractor or of any subcontractor or employee of the Contractor,
then this obligation to be void; otherwise to remain in full force
and virtue.

In testimony whereof, The said principal and surety have signed,
sealed, and delivered this bond this¹ day of
....., A. D. 191..

WITNESSES:

(1)
(2)
(1)
(2)
(If Contractor is a partnership every partner must sign here individually.)
(If principal is a corporation, place seal here.)

¹ NOTE.—This date must agree with, or be earlier than, the date of the certificate on the following page.

(If Contractor is a corporation, this certificate must be furnished and must be executed as of the same date as the bond, or a date subsequent thereto.)

CERTIFICATE OF AUTHORITY OF CORPORATE CONTRACTOR'S OFFICERS.

.....
(City and date.)

I hereby certify that and

(Names of executing officers.)

..... of

(Titles.)

(Name of corporation.)

have been duly elected to their said respective offices, and that as
said officers they were authorized, as shown by certified copy of
minutes hereto attached, to execute on behalf of said corporation
the attached contract and bond as of the dates of execution
appearing thereon.

..... [CORPORATION SEAL.]
Secretary.

(Or other title of certifying officer.)

(Attach hereto certified copy of minutes of board of directors showing authority
of officer to sign foregoing contract and bond.)



UNITED STATES DEPARTMENT OF LABOR

SELECTED BIBLIOGRAPHY
OF INDUSTRIAL HOUSING IN AMERICA AND GREAT BRITAIN
DURING AND AFTER THE WAR



REPORT OF
BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION
UNITED STATES HOUSING CORPORATION

PREFATORY NOTE.

This bibliography represents primarily published material to which members of the United States Housing Corporation staff had access in the corporation's reference library, together with some additional references from the Department of Labor Library, the Library of Congress, and the Library School of the University of Wisconsin, all of which libraries have compiled unpublished bibliographies relating in whole or in part to industrial housing during the war. There have been selected from a thousand or more articles, pamphlets, and books—mostly issued prior to April 15, 1919—about 250 references, which seem to have practical value to students of this subject. The limited scope of the list did not permit the inclusion of many useful references on rural housing less closely associated with war-time problems, although undoubtedly a part of the necessary program of future reconstruction. In making the selection, division and section heads among the Housing Corporation's staff were freely consulted in connection with the various titles for subject matter coming within their respective jurisdictions.

THEODORA KIMBALL,
Librarian, School of Landscape Architecture at Harvard University,
Consulting Librarian, United States Housing Corporation.

WASHINGTON, D. C., May 10, 1919.

SELECTED BIBLIOGRAPHY OF INDUSTRIAL HOUSING IN AMERICA AND GREAT BRITAIN DURING AND AFTER THE WAR.

SUMMARY.

GENERAL.

HOUSING AGENCIES.

Government: Federal.—State and Municipal.

Private Capital: Industrial Corporations.—Cooperative Societies.

WAR EMERGENCY PROBLEMS: Labor and Housing, Labor Turnover.—Real Estate Acquisition and Commandeering, Requisitioning and Billeting.—Registration Bureaus and Room Renting.—Landlord and Tenant Relations, Rent Profiteering.—Transportation.

PLANNING AND DEVELOPMENT OF HOUSING SCHEMES: General.—Technical Methods of United States Government Designers.—Housing Standards.—Types of Community Development.—Construction of Housing Schemes.

HOUSES: HOUSE TYPES AND TYPES OF CONSTRUCTION: House Types.—Building Materials and Types of Construction.

HOME OWNERSHIP AND MANAGEMENT PROBLEMS: Home Ownership.—Renting and Management.—Special Community Facilities.

HOUSING FINANCE: General.—Governmental Aid.

LAND VALUES AND TAXATION.

GENERAL.

For a background of the subject of industrial housing developments, the reader is referred to numerous pre-war publications:—e. g. *City Planning*, a series of essays by seventeen experts, 1916, edited by John Nolen, containing papers on Residential and industrial decentralization, etc.; *City Planning Progress in the United States*, 1917, edited by George B. Ford, containing local items on housing in cities throughout the United States; and, *Town Planning for Small Communities*, by the Walpole (Mass.) Town Planning Committee, 1917, containing a section: Housing. Current references to industrial housing developments and to literature on housing may be found in the *Monthly Labor Review* (U. S. Bureau of Labor Statistics); *Housing Betterment*, quarterly, (National Housing Association) and other serial publications of the association, *The Survey* (weekly), *American Contractor* (weekly), *American City* (monthly), the *Record and Guide*, and other real estate magazines.

Ackerman, Frederick L. The real meaning of the housing problem. (*Journal of the American Institute of Architects*, May 1918, v. 6, p. 229-232.)

Read at the Annual Convention of the Institute in Philadelphia, May 28, 1918. Sketches a "liberal" program of housing and town planning in "terms of philosophy, of science, of education, of art, of the technique of government."

Adams, Thomas. Housing and social reconstruction. (*In National Conference on Housing, Housing problems in America*, 1918, v. 7, p. 3-37.)

Abridged in Landscape Architecture, Jan. 1919. Mr. Adams discusses American after-war housing problems and concludes by advocating a governmental housing program in which the Federal Government is the advisory agency and the states and municipalities the constructive agencies.

———. The housing problem and production. (*Conservation of life*, July 1918, v. 4, p. 49-57. illus.)
Lessons to Canada from experience of Great Britain.

Community planning for war-time industries. (City plan, Apr. 1918, v. 3, no. 4, p. 6-14.)

Brief addresses by Messrs. Olmsted, Adams, Goodrich, Whitaker, and Childs at war-time meeting of American City Planning Institute (Philadelphia, Feb. 26, 1918) on war-housing policy, finance, and management.

Ihlder, John. War-time-housing in America. (*National municipal review*, Nov. 1918, v. 7, p. 553-560.)

Omits discussion of Housing Industrial Workers, which is covered in a section by that title in the following article in the same number of the magazine.

Kimball, Theodora. A review of city planning in the United States, 1917-1918. (*National municipal review*, Nov. 1918, v. 7, p. 605-613.)

Includes account of work of United States Housing Corporation.

Nolen, John. A good home for every wage-earner; an address delivered at the Twelfth Annual Convention of the American Civic Association, Washington, D. C., Dec. 15, 1916. Washington, American Civic Association, April 1917. 23 p. (Series II, no. 9.)

Contains list of low-cost housing developments based on Davison list referred to later in section: Housing by Industrial Corporations. The supplement to this publication contains a statement prepared for the War Shipping Committee of the Chamber of Commerce of the United States.

National Conference on Housing. Housing problems in America. Vol. 6. Proceedings of the National Conference on Housing, 1917. New York, National Housing Association.

This volume is partly devoted to war-housing problems, including papers by Mr. C. H. Whitaker, Mr. Philip Hiss, and Miss Harlean James.

———. Vol. 7. 1918.

A large number of the papers (some of them separately noted in this list) deal with war-time housing problems in the United States, especially with Governmental action and with the future of the Government's war-housing developments.

National Housing Association. War-housing problems in America. A symposium on war housing held under the auspices of the National Housing Association, February 25, 1918, Philadelphia. (New York, The Association, 1918.) 141 p.

The discussions (by Mr. Veiller, Mr. Olmsted, Mr. Ackerman, Mr. Adams, Mr. Hiss, Mr. Ihlder, Miss Mead, Miss Musson, Mrs. Wood, and others) center around the urgent need for governmental action in housing workers in war industries, and the character of the accommodations to be provided.

Southern Pine Association. Homes for workmen. A presentation of leading examples of industrial community development. New Orleans, The Association (1919). 250 p. illus. plans.

A useful compilation of articles (most of them reprints) by well-known writers on housing, including discussions of general principles, as well as typical recent housing developments, fully illustrated.

Veiller, Lawrence. Industrial housing developments in America: Part VI. Housing after the war. (Architectural record, Aug. 1918, v. 44, p. 141-151. illus.)

British reconstruction proposals cited as significant of magnitude of whole after-war housing program.

Vincent, George Edgar. Housing and reconstruction. (*In* National Conference on Housing, Housing problems in America, 1918, v. 7, p. 38-49.)

The point of view of the President of the Rockefeller Foundation that "American private enterprise and initiative in voluntary associations, and public opinion created by these agencies, can accomplish a great deal and perhaps solve the problem."

Whitaker, Charles Harris, and others. The housing problem in war and in peace. Washington, The Journal of the American Institute of Architects, 1918. 116 p. illus. plans.

All of the material with the exception of a few illustrations is reprinted from the Journal of the American Institute of Architects, issues of September 1917 to February 1918, inclusive.

Contents. What is a house? I-III, by Charles Harris Whitaker.

IV, by Frederick L. Ackerman.

V, by Richard S. Childs.

VI, Constructive housing legislation and its lesson for the United States, by Edith Elmer Wood.

Government housing scheme; Well Hall, Eltham, Kent.

Eastriggs; an industrial town built by the British government.

Housing by the Commonwealth of Massachusetts.

Small-house reconstruction in France.

Appendix. The New York City tenement-house law—The need of town-planning legislation and procedure for control of land as a factor in house-building development, by Thomas Adams.

Great Britain.

The following references have been chosen as representing the more general discussions of British housing problems. For other British material the reader is referred to later sections of this list, especially: Government Housing, Planning and Development, and Governmental Aid.

Adams, Thomas. Reconstruction in Great Britain. (National municipal review, Mar. 1919, v. 8, p. 118-125.)

Rochester Reconstruction Conference address. Includes housing problems.

Aldridge, Henry R. Housing and town planning in 1917; a review of record progress. (Municipal journal (London), Jan. 4, 1918, v. 27, p. 11-12.)

———. Housing after the war. (*In* Dawson, W. H., ed. After-war problems. London, G. Allen and Unwin Ltd., 1917, p. 233-250.)

A brief comprehensive discussion. Calls for building of homes for returned soldiers according to sound town planning principles.

Childs, Richard S. The new garden cities of England. (Outlook, Mar. 6, 1918, v. 118, p. 364-366.)

Also reprinted by Committee on New Industrial Towns. Article describes new war towns and makes comparisons with American conditions.

Great Britain. Local Government Board. Annual reports. Part 2. Housing and town planning. 1914 to date.

The Local Government Board is the agency charged with promoting the development of housing schemes by Local Authorities and with passing on their conformity to the Housing and Town Planning act of 1909. See also weekly reports of progress in Municipal Journal (mentioned below) and items under section: Governmental Aid.

———. **Ministry of Reconstruction.** Reconstruction problems. London, H. M. Stationery Off., 1918.

The following numbers of the series relate to housing:

1. The aims of reconstruction. 18 p.

2. Housing in England and Wales, 24 p.

4. Housing in Scotland. 23 p.

———. . . . Housing in England and Wales. Memorandum by the Advisory Housing Panel on the emergency problem . . . London, H. M. Stationery Off., 1918. 15 p. (Cd. 9087.)

Housing after the war. Some current notes on salient aspects (Town planning review, Apr. 1918, v. 7, p. 219-242.)

A most valuable summary of the war-time and after-war situation in Great Britain. Reviewed in Landscape Architecture, July, 1918, in article: Our British allies and reconstruction.

Joint Committee on Labour Problems After the War. A million new houses after the war; a statement on the housing problem as affected by the war and some suggestions. London, Cooperative Printing Society, Ltd., 1917. 8p.

An historic document. It should be compared with section XVI of The Resolutions on Reconstruction of The British Labour Party, in which the following appears: "That it is essential that the 'Million Cottages of the Great Peace,' to be erected during the first two or three years after the war ends by the local authorities, with capital supplied by the National Government, free of interest, and a grant-in-aid in one or other form at least sufficient to prevent the schemes involving any charge on the rates, should be worthy to serve as models to other builders; and must accordingly be, not only designed with some regard to appearance, not identical throughout the land, but adapted to local circumstances, and soundly constructed, spacious, and healthy; including four or five rooms, larder, scullery, cupboards, and fitted bath, but also suitably grouped not more than ten or twelve to the acre; and provided with sufficient garden ground."

Municipal Journal. (London.) Weekly.

One of the best sources of current information on British housing. The file from March 22, 1918, contains many expressions of views on the Government State Aid proposition, as put forth in the Circular of Mar. 18, 1918.

National housing and national life; discussion at the 12th informal Conference, held at the Royal Institute of British Architects, March 13, 1918. Mr. W. R. Davidge in the chair. (Journal of the Royal Institute of British Architects, June 1918, v. 25, p. 169-178.)

Reiss, Richard L. The home I want. London, Hodder & Stoughton, [1918.] 175 p. illus.

Deals with the main facts of the present British legislative situation in regard to housing as well as with town planning. An authoritative publication.

Scotland. Royal Commission on Housing in Scotland. Report of the Royal Commission on the housing of the industrial population of Scotland, rural and urban. Edinburgh, H. M. Stationery Off., 1917. 460 p. (Cd. 8731.)

A comprehensive report outlining conditions and remedies.

No illustrations, but numerous tables showing shortage of houses in Scotland. Summarized in Monthly Review of U. S. Bureau of Labor Statistics, Dec., 1917.

Spensley, J. Calvert. Urban housing problems. (Journal of the Royal Statistical Society, March 1918, v. 81, pt. 2, p. 161-228.)

Relates especially to London, but has section: Housing after the war (p. 205-209). Pp. 211-228 are discussion.

HOUSING AGENCIES.

GOVERNMENT.

FEDERAL.

UNITED STATES.

In general, more recent articles have been selected for this section, except for a few standard items of historic interest. The volume of Proceedings of the National Conference on Housing, 1918 (referred to above) should also be consulted. A number of the articles in the three following sections, relating more specifically to the work of each of the three Government housing agencies contain some general discussion of the war housing problems in the United States.

Space does not permit the inclusion of references to numbers of the Official U. S. Bulletin nor to the Congressional Record containing the discussions in Congress on war housing needs and appropriations for both Shipping Board Housing Division and the Housing Bureau of the Department of Labor, nor to the hearings on the subject before congressional committees preceding passage of the bills and after the signing of the armistice. Exact references to the Official Bulletin and Congressional Record may be found in the volumes of the Public Affairs Information Service Index, and to the hearings so far as they relate to the Department of Labor housing activities in the first volume of the Report of the United States Housing Corporation (to be issued).

Ackerman, Frederick L. Government housing—Federal, State, municipal—is it desirable? (*In* National Conference on Housing, Housing Problems in America, 1918, v. 7, p. 70-81. With discussion p. 292-296.)

— — — — — What is a house? IV. (*Journal of the American Institute of Architects*, Dec. 1917, v. 5, p. 591-639. illus. plans.)

Also published in Whitaker, C. H. and others. The housing problem in war and in peace. *Also reprinted separately.* This important document comprises the results of Mr. Ackerman's study (undertaken at the instance of the Council of National Defense and the American Institute of Architects) of British Government war housing and his diagnosis of the situation in the United States. A brief popularized statement by Mr. Ackerman appeared in the *American City*, Feb. 1918; and the report is reviewed by the U. S. Bureau of Labor Statistics in its *Monthly Review* for the same month.

Childs, Richard S. What will become of the Government housing? The Government's principal permanent housing projects. (*National municipal review*, Jan. 1919, v. 8, p. 48-52.)

Includes a descriptive list of the Government's housing projects and advocates future cooperative ownership. A similar article by Mr. Childs: A brief record of progress in the Government's war housing program, appeared in the *Journal of the American Institute of Architects* for Sept. 1918 (also reprinted); and an illustrated article, in *The Survey* for Feb. 1, 1919, advocating a permanent Housing Bureau.

Federal housing. (U. S. Bureau of Labor Statistics, *Monthly review*, Feb. 1918, v. 6, p. 456-460.)

Early history of movement for Government housing.

Gove, George. Housing the workers—an unfinished job; the present status of Government housing projects—a challenge to local chambers of commerce to meet an emergency which Congress seems unwilling to face. (*American city*, Jan. 1919, v. 20, p. 23-25.)

Knowles, Morris. What about the Government housing program? Engineers should be active in study of housing in general and of solution of the problem of disposing of those Government projects already under way. (*Engineering news-record*, Feb. 13, 1919, v. 82, p. 329-331.)

Urges that Government housing projects should be made into "going concerns" before relinquishment by the Government.

LaFarge, C. Grant. The case of Government housing. (*New Republic*, Jan. 18, 1919, v. 17, p. 335-337.)

A somewhat similar article by Mr. LaFarge appeared in the *American Architect* for Jan. 8, with the title: Government housing: What will follow? Both articles deal with the work and ideals of the United States Housing Corporation and the problems of housing confronting the country calling for post-war measures.

Lasker, Bruno. The housing of war workers: Lessons from British experience for the fulfillment of an urgent task. (*Survey*, Jan. 5, 1918, v. 39, p. 390-397. illus. plans.)

Argument for Government housing.

National Housing Association. Housing and the war—a letter to President Wilson. (*Housing betterment*, Dec. 1917, v. 6, p. 1-8.)

Also reprinted as a National Housing Association pamphlet. Urging action by the Federal Government to meet the war emergency in the housing situation.

Pope, Robert Anderson. Governmental housing. (*New Republic*, Nov. 24, 1917, v. 13, p. 93-95.)

A rejoinder by Mr. John Nolen was published in the *New Republic* for Dec. 22, and two further articles by Mr. Pope in the issues for Jan. 12 and Feb. 2, 1918.

A proposed Federal agency to deal with housing, town planning and other municipal affairs. (*American city*, Feb. 1919, v. 20, p. 179.)

Brief report, signed by Andrew Wright Crawford, of the Philadelphia Conference, Jan. 3, 1919, called by representatives of the American Civic Association and the American Federation of Labor.

Stein, Charles S. Housing and reconstruction. (*Journal of the American Institute of Architects*, Oct. 1918, v. 6, p. 469-472.)

Discusses future possibilities of Government housing, especially of the Housing Bureau of the Department of Labor.

War housing in the United States. (*Housing betterment*, Feb. 1919, v. 8, no. 1, p. 6-13.)

A summary containing tables of projects.

Woodworth, Leo Day. The public housing problem viewed from another angle . . . some serious phases of problem of Government and municipal housing. (*Current affairs*, Boston, June 10, 1918, v. 9, no. 6, p. 2, 5.)

In opposition to governmental housing. Mr. Woodworth's views were extensively printed in newspapers throughout the country.

UNITED STATES. DEPARTMENT OF LABOR—BUREAU OF INDUSTRIAL HOUSING AND TRANSPORTATION (UNITED STATES HOUSING CORPORATION).

In addition to these articles on the work of the United States Housing Corporation as a whole and on the separate projects, the reader should consult the following sections of this List: under Planning and Development, Technical Methods of U. S. Government Designers, and Housing Standards; under War Emergency Problems, the sub-sections: Real Estate Acquisition, Registration Bureaus, Rent Profiteering, and Transportation.

Official Documents.

The official comprehensive report of the United States Housing Corporation is to be comprised in two volumes, in the Appendix to which this List is being issued.

U. S. Dept. of Labor. Bureau of Industrial Housing and Transportation. Report of the United States Housing Corporation, Dec. 3, 1918. Washington, Govt. Print. Off., 1919. 126p.

Summarized in Monthly Labor Review, Feb. 1919.

U. S. Secretary of Labor. 6th annual report, for year ending June 30, 1918.

Contains report of Bureau of Industrial Housing and Transportation, p. 130-136. (Oct. 10, last date mentioned in report.)

Representative Articles.

Eidlitz, Otto M. The housing of munitions workers; what the Bureau of Industrial Housing and Transportation is doing to help. (American city, June 1918, v. 18, p. 499-501.)

A preliminary article, before the housing appropriations were secured.

———. Priority orders for housing developments. (American city, Oct. 1918, v. 19, p. 266-267.)

Syndicated item, indicating procedure for private house-building enterprises.

———. Getting work and worker together. Handling the deepest of human instincts, homemaking, the Housing Corporation redraws our industrial map, besides designing cottages, shifting population, building towns. (Nation's business, Dec. 1918, v. 6, p. 29-30, 48. illus.)

Extent of the operations of the U. S. Housing Corporation. (Municipal and county engineering, Nov. 1918, v. 55, p. 176-177.)

Ford, James. Housing for workers engaged on army and navy contracts. (Annals of the American Academy of Political and Social Science, Sept. 1918, v. 79, p. 270-274.)

Also reprinted.

———. The housing question—Government aid in war-time America. (In Proceedings of United States League of Local Building and Loan Associations, 26th, 1918, p. 121-126. With discussion p. 139-140.)

Includes a statement of the reasons why the United States Housing Corporation did not form local housing companies.

LaFarge, C. Grant. See preceding section.

Leland, Joseph D., 3d. What the Federal Government has done to house the industrial army. (In National Conference on Housing, Housing problems in America, 1918, v. 7, p. 50-69. With discussion, p. 287-291.)

Olmsted, Frederick Law. Lessons from the housing developments of the United States Housing Corporation. (Monthly labor review (U. S. Bureau of Labor Statistics), May 1919, v. 8, p. 27-38. illus. plans.) Also reprinted.

By the Chief Town Planner of the Corporation.

Wilson, William B. Housing our industrial army. (National service, August 1918, v. 4, p. 1-6. illus.)

A description by the Secretary of Labor of the formation and aims of the U. S. Bureau of Industrial Housing and Transportation.

Wood, Charles W. Housing the workers; the Government close-up. (In The great change. N. Y., Boni and Liveright, 1918, p. 81-89.)

Substantially reprinted from N. Y. World, July 21, 1918. An interview with Mr. J. D. Leland, 3d, Vice-President of the Housing Corporation.

*Projects.***Bath, Me.**

The United States Housing Corporation. Project no. 59 at Bath, Maine. (Architectural record, Jan. 1919, v. 45, p. 21-25. illus. plans.)

Bremerton, Wash.

Ford, James. Government housing at Bremerton, Washington. (Architect and engineer of California, Jan. 1919, v. 56, p. 50-56. illus. plans.)

Bridgeport, Conn.

Shurtleff, Arthur A. The development of a street plan for an industrial housing project. (Landscape architecture, Jan. 1919, v. 9, p. 67-75. plans.)

The Crane development at Bridgeport, of which Mr. Shurtleff was town planner.

Bridgeport, Conn.—Continued.

Baxter, Sylvester. The Government's housing at Bridgeport, Connecticut. (Architectural record, Feb. 1919, v. 45, p. 123-141. illus. plans.)

Charleston, W. Va.

May, Charles C. Housing development for the United States Naval Ordnance Plant near Charleston, W. Va. (Architectural forum, Nov. 1918, v. 29, p. 131-135. illus. plans.)

Hammond, Ind.

The work of the United States Housing Corporation: Project no. 457—Hammond, Indiana. (Architecture, Feb. 1919, v. 39, p. 52-54, 55. illus. plans.)

Neville Island, Pa.

Government housing in Pittsburgh. (Municipal journal, New York, Oct. 19, 1918, v. 45, p. 311.)

Announcement of Neville Island project, abandoned after armistice.

New Brunswick, N. J.

Housing development at New Brunswick, New Jersey, for the United States Housing Corporation. (Architectural forum, Dec. 1918, v. 29, p. 163-165. illus. plans.)

Portsmouth, Va.

Housing construction at Cradock; building a project near the Portsmouth Navy Yard to provide homes for five thousand workers—distributing railroad—central concrete plant—concrete delivered by tractors—progress clock. (Municipal journal, New York, Jan. 25, 1919, v. 46, p. 61-63. illus.)

Quincy, Mass.

Development for the United States Housing Corporation at Quincy, Mass. (Architectural review, Jan. 1919, v. 8, p. 21-23. illus. plans.)

Baxter, Sylvester. The Government's housing project at Quincy, Mass. (Architectural record, Mar. 1919, v. 45, p. 242-261. illus. plans.)

Vallejo, Calif.

Hays, William C. The Vallejo housing scheme; United States Housing Corporation's project no. 581. (Architect and engineer of California, Jan. 1919, v. 56, p. 39-49. illus. plans.)

Includes data on utilities by Stephen E. Kieffer.

Washington, D. C.

Causey, Edward H. Housing war workers at Washington. (National builder, Nov. 1918, v. 60, p. 39-43. illus.)

Housing war workers in Washington. (American architect Dec. 4, 1918, v. 114, p. 661-665. illus. plan.)

Union Station Plaza Hotels.

Watertown, N. Y.

An housing development at Watertown, N. Y., for the United States Housing Corporation. (Architectural review, Dec. 1918, v. 7, p. 129-131. illus. plans.)

UNITED STATES SHIPPING BOARD (EMERGENCY FLEET CORPORATION).

In addition to these articles, see the article by Mr. Taylor in the section of this List: Transportation, under War Emergency Problems, and the article on E. F. C. hotels, in section: House types.

Official Documents.

Under the editorship of Mr. F. L. Ackerman a complete official technical report on the work of the Housing Division of the Shipping Board has been prepared and will probably be issued.

Representative Articles.

Ackerman, F. L. Houses and ships. (American city, Aug. 1918, v. 19, p. 85-86.)

Describes the housing work of the Shipping Board.

———. Note on Shipping Board housing policy. (*In Proceedings of United States League of Local Building and Loan Associations*, 26th, 1918, p. 131-133.)

Includes form of loans of Shipping Board to subsidiary corporations for housing purposes.

How shipyard housing work is organized and operated. Division of Fleet Corporation has developed an organization in which engineers play a large part—sixteen projects under way. (*Engineering news-record*, July 18, 1918, v. 81, p. 122-124.)

Diagram shows organization of Division of Passenger Transportation and Housing.

*Projects.***Bristol, Pa.**

Taylor, C. Stanley. Bristol, America's greatest single industrial housing development. (*American architect*, May 15, 1918, v. 113, p. 599-615. illus. plans.)

Camden, N. J.

Childs, Richard S. The first war emergency Government towns for shipyard workers. I. "Yorkship Village" at Camden, N. J. (*Journal of the American Institute of Architects*, May, 1918, v. 6, p. 249-251. see illus. p. 237-244 and frontis.)

An illustrated article by the same author appeared in the *Independent* for June 22, 1918, and articles by Mr. C. C. May and Mr. R. F. Warner respectively in the *Architectural Forum* for June, 1918, and the *Architectural Review* for the same month.

Litchfield, Electus D. Recent Government housing developments: Yorkship Village, Camden, N. J. (*In National Conference on Housing, Housing problems in America*, 1918, v. 7, p. 82-93.)

Mr. Litchfield was the architect of Yorkship Village.

Groton, Conn.

The first war emergency Government towns. IV. Groton, Conn. (*Journal of the American Institute of Architects*, Nov. 1918, v. 6, p. 510-517. illus. plans.)

Hilton, Va.

NOTE: Compare the publication of the Committee on New Industrial Towns proposing a co-partnership scheme for Hilton, noted in section of this List: Cooperative Societies.

Hubbard, Henry V., and Francis Y. Joannes. The first war emergency Government towns. II. Hilton, Va. (*Journal of the American Institute of Architects*, July 1918, v. 6, p. 333-345. illus. plans.)

Practically the same article, unsigned, was published in the *American Architect* for Aug. 7, heavily illustrated. See also the article in *Landscape Architecture* including Hilton by Mr. Hubbard noted in the section of this List: Planning and Development.

Hog Island, Pa.

Shepherd, Richard. Emergency Fleet housing in Philadelphia: 3,000 homes for the Hog Island shipbuilders of permanent construction, 2-story row type. (*American builder*, May 1918, v. 25, p. 28-29, 140. illus. plans.)

Blood, W. H., jr. New E F C hotel at Hog Island. (*Stone & Webster journal*, Nov. 1918, v. 23, p. 344-346. illus.)

Port Jefferson, L. I.

Bossom, Alfred C. The Emergency Fleet Corporation project for the Bayles Shipyard, Inc., at Port Jefferson, Long Island. (*Architecture*, Sept. 1918, v. 38, p. 255+plates 151-155. illus. plans.)

Portsmouth, N. H.

The first war emergency Government towns. III. Atlantic Heights. (Portsmouth, N. H.) (*Journal of the American Institute of Architects*, Sept. 1918, v. 6, p. 427-434. illus. plans.)

Another illustrated article, by Mr. W. R. Greeley, associated in the design of the town, appeared in the *American Architect* for Oct. 16, 1918.

Kilham, Walter H. Recent Government housing developments: Atlantic Heights at Portsmouth, N. H. (*In National Conference on Housing, Housing problems in America*, 1918, v. 7, p. 94-100.)

Mr. Kilham's firm were the architects of the development.

Wilmington, Del.

NOTE: A general report to the Chamber of Commerce of Wilmington on War-time housing and community development (1918, 24 p.) was prepared by Mr. Nolen, the town planner of the project named below.

Groben, William E. Union Park Gardens; a model garden suburb for shipworkers at Wilmington, Del. built for the United States Shipping Board, Emergency Fleet Corporation. (*Architectural record*, Jan. 1919, v. 45, p. 45-64. illus. plans.)

An earlier description by the same writer appeared in *Architecture* for Sept. 1918.

Perrot, Emile G. Recent Government housing developments: Union Park Gardens, Wilmington, Delaware. (*In National Conference on Housing, Housing problems in America*, 1918, v. 7, p. 101-117.)

Mr. Perrot's firm, with which Mr. Groben (above) is also associated, were architects of the development.

UNITED STATES. ORDNANCE DEPARTMENT.

*Projects.***Muscle Shoals, Ala.**

Warner, Ralph F. Muscle Shoals—a new industrial town in Alabama. (*Architectural review*, Jan. 1919, v. 8, p. 18-20. illus. plans.)

Perryville, Md.

The town of Perry Point, Md.: a development by the U. S. Ordnance Department. (*Architectural review*, Feb. 1919, v. 8, p. 45-50. illus. plans.)

An earlier illustrated article on "Perryville" appeared in the *American Architect* for Oct. 30, 1918.

Sheffield, Ala.

May, Charles C. Housing development for the Air Nitrate Corporation, Sheffield, Ala. (*Architectural forum*, Sept. 1918, v. 29, p. 69-74+plates 46-48. illus. plans.)

GREAT BRITAIN.

Official Documents.

The Housing Acts of 1914 and 1915 and Defense of the Realm (Acquisition of Land) Act of 1916 gave authority for the war housing schemes. A new Housing Bill has been presented to Parliament providing state aid for after-war housing, and intervention by National authority in case of remissness on the part of Local Authorities in promoting housing schemes. Further references to British state aid proposals will be found in the section Governmental Aid near the end of this List.

Great Britain. Ministry of Munitions. Memo. regarding housing carried out by the Ministry of Munitions or housing in connection with which financial assistance has been given by the Ministry. (*Appendix to Report of Great Britain. Committee of Public Accounts*, 1917, p. 216-222.)

Financial statistics given.

Representative Articles.

Ackerman, Frederick L. The housing question—Government aid in war-time England. (*In Proceedings of United States League of Local Building and Loan Associations*, 26th, 1918, p. 127-140. Discussion p. 139-140.)

Cf. Mr. Ackerman's report of Dec. 1917, noted in section of this List: Government, Federal, United States (above).

Culpin, Ewart G. The community sense. (Garden cities and town planning, Oct.-Nov. 1915, v. 5, p. 198-200.)

Principally a description of the Government housing scheme at Woolwich (Well Hall).

Magnusson, Leifur. War housing in Great Britain. (U. S. Bureau of Labor Statistics, Monthly review, Dec. 1917, v. 5, p. 1292-1301.)

General account, with descriptions of schemes. Another article by Mr. Magnusson in the June 1918 Monthly Review deals with the financial aspects and gives figures of British Government appropriations.

Schemes.

Descriptions of Well Hall in Kent, the housing scheme for the Woolwich Arsenal (Cf. article by Mr. Culpin noted above) and for Easttriggs appeared in the *Journal of the American Institute of Architects* for Sept. and Oct. 1917, reprinted in: *The Housing Problem in War and in Peace*. Views of Gretna appeared in the same publications and also in the *American City* for May 1918. In addition to these illustrated and readily accessible articles should be noted also:

Baines, Sir Frank. Roe Green village scheme, Kingsbury, England. (Monthly labor review (U. S. Bureau of Labor Statistics), Oct. 1918, v. 7, p. 1087-1093.)

Sir Frank Baines was principal architect of the British Office of Works, under whose direction the scheme was designed and carried out.

STATE AND MUNICIPAL.

The dearth of published matter on American state or municipal housing indicates our lack of such enterprises. The Massachusetts Homestead Commission has made a small beginning for industrial workers in the Lowell project described in Bulletin No. 7 issued by the Commission. The California Durham experiment is for agriculturists. The State of South Dakota by recent legislation has made housing part of the State's program. Municipal housing, however, has not yet been introduced in this country. A discussion of its legal aspects by F. B. Williams, Esq., of New York City, entitled: Must we await constitutional amendments before cities can engage in housing, appeared in the *American City* for Feb. 1919.

In Great Britain, housing schemes by municipalities have been in operation for some time. A record of progress of these may be found in the section: Housing of the Working Classes, in the *Municipal Year Book of the United Kingdom*, published by the *Municipal Journal*, London. Recent reports for such schemes proposed in connection with the Reconstruction period have been published by Dundee, Scotland (1917) and by Birmingham, England (1918). In the latter, a chapter is devoted to the subject: Municipal building vs. private enterprise. The new national scheme of state aid places the burden of action on the Local Authorities. For discussions of this scheme see the section of this List: Government Aid.

PRIVATE CAPITAL.

Housing enterprises undertaken by private capital might be divided roughly into four groups: those financed by industrial corporations to increase their own efficiency through the benefit of good housing to their employees; those financed by cooperative or copartnership societies, in which the tenants are shareholders, and profits turned into community improvements; those undertaken

by limited dividend corporations, in which profit to investors has been subordinate to the purpose of providing good living accommodations whether the houses be rented or sold; and, most prevalent of all, those launched by the so-called "speculative builders" in which their own personal gain has been the dominant motive. Some references to published material relating to the two first-mentioned groups of housing agencies employing private capital are given in the following sections; and for the third, limited dividend corporations, the reader is referred to the items on this subject in the Davison list referred to in the next section, to the references in the section of this List: Housing Finance, General (two of which include discussion of the limited dividend corporation), and to the annual reports of the corporations themselves, e. g., the City and Suburban Homes Company of New York City.

INDUSTRIAL CORPORATIONS

Brief descriptions of housing developments undertaken by Industrial Corporations may be found in the Davison list (*Architectural Review*, Apr. 1917, illustrated) already referred to, and in the Magnusson report mentioned below. In addition to the housing developments mentioned in these two publications, the reader might secure the following pamphlets descriptive of recent undertakings: *Eclipse Park Homes* (Eclipse Home Makers, Inc. Beloit, Wis.); *Sawyer Park* (Williamsport Realty Co., Williamsport Pa.); *A modern Industrial Suburb—Morgan Park*, Duluth, Minn. (reprint from U. S. Bureau of Labor Statistics Monthly Review); also consult Publication no. 7 of the Harvard Department of Social Ethics (*Low-cost cottage construction*, by W. A. Hamlin), referred to in the section of this List: House Types.

Allen, Leslie H. Industrial housing problems. Boston, Aberthaw Construction Company (1917). 31 p. illus. plans.

Although general in its conclusions, the text deals principally with the experience of industrial corporations.

Forster, H. Walter. Industrial housing. (*In Proceedings of the Engineers' Society of Western Pennsylvania*, Dec. 1917, v. 33, p. 610-620. With discussion, p. 620-642.)

The paper and discussion relate largely to employers' problems, including references to Mr. Magnusson's investigations.

Groben, William E. Modern industrial housing. Philadelphia, New York, Ballinger & Perrot, 1918. 24 p. illus. plans.

Primarily on industrial employers' policy and procedure.

Magnusson, Leifur. Employers' housing in the United States. (U. S. Bureau of Labor Statistics, Monthly review, Nov. 1917, v. 5, p. 869-894.) Also reprinted as *Housing by employers in the United States*.

This is a summary of a forthcoming book by the same writer with the latter title, which will be the authority on this subject. A second article entitled, *Sanitary aspects of company housing*, was published in the *Monthly Labor Review* (U. S. Bureau of Labor Statistics) for Jan. 1919, with tables, and a third article, *Methods of sale of company houses*, in the *Review* for April.

United States Steel Corporation. Bureau of Safety, Sanitation and Welfare. (New York City) Bulletin No. 7, December 1918. 106 p. illus. plans.

Description and illustrations of various United States Steel Corporation's housing developments.

COOPERATIVE SOCIETIES

Committee on New Industrial Towns. (8 W. 9th St., New York City) Publications (most of which have been reprinted by the Committee), as follows:

A memorandum to the U. S. Steel Corporation. A plan for the conservation of future increments of land values at Ojibway and for conversion of the same into additional revenues for community purposes.

The unearned increment in Gary, by Robert Murray Haig. (*Political science quarterly*, March 1917.)

Committee on New Industrial Towns—Continued.

The new garden cities of England, by R. S. Childs. (Outlook, March 6, 1918.)

How shall the Government dispose of its industrial housing, by R. S. Childs. (Reprint of article entitled: Group ownership of housing, New Republic, March 30, 1918.)

A self-owning town. A report to Mr. F. P. Palen, Vice President Newport News Shipbuilding and Dry Dock Company, regarding "A copartnership scheme for Hilton."

Copartnership in England, a review of the British movement for group ownership of small homes, by H. S. Swan. (Journal of the American Institute of Architects, April 1918.)

The unearned increment in Lackawanna, by H. S. Swan. (National municipal review, March 1919.)

NOTE: A series of syndicated articles Self-owning Towns of Tomorrow appeared in the press under the auspices of this Committee.

Purdy, Lawson. Own your own town. (*In* National Conference on Housing, Housing problems in America, 1918, v. 7, p. 273-284. With discussion by Richard S. Childs, p. 324-325.)

An earlier article on self-owning towns by Mr. Purdy was published in the Annals of the American Academy of Political and Social Science for July 1918.

Stabilizing labor. (Public, Apr. 6, 1918, v. 21, p. 427-428.)

Proposes cooperative housing companies, following the proposals of the Committee on New Industrial Towns.

Taylor, C. Stanley. The future and influence of American war housing developments. (American architect, Dec. 18, 1918, v. 114, p. 721-725.)

After pointing out dangers to housing progress of possible unfortunate mistakes in administration of Government towns and of indiscreet "unloading" of Government realty holdings, Mr. Taylor offers as a solution the taking over of the entire industrial housing projects of the Government by a copartnership organization under Government supervision.

Great Britain.

In addition to the references following, see the article by Mr. Swan published by the Committee on New Industrial Towns mentioned above, and also the British report on government aid to public utility societies mentioned in the section of this List: Governmental Aid. A considerable number of pamphlets on copartnership housing were published in England prior to 1914.

The case of utility societies. (Municipal journal, London, Dec. 6, 1918, v. 27, p. 1107.)

An earlier article (Aug. 9) presented the main facts of the situation to that date.

Culpin, Ewart G. An after-the-war policy for public utility societies. (The architect, Oct. 20, 1916, v. 96, p. 240-242.) *Also reprinted.*

Mr. Culpin was active in the movement to secure Government recognition of the usefulness of public utility societies in meeting the after-war situation. See the reprint of letter addressed by the Garden Cities and Town Planning Association to the local housing authorities of Great Britain urging the formation of or cooperation with a society of public utility, published in Garden Cities and Town Planning, Dec. 1917.

Lander, H. Clapham. A proposal for the establishment of a new town. London, National Labour Press, 1918. 15 p.

Abstract published in Garden Cities and Town Planning, Mar. 1918, and in the Survey for Aug. 10, 1918. The proposal is for a complete cooperative town.

National housing after the war, by L. G. C. (*In* Cooperative Wholesale Societies, Ltd. Annual, 1918, Manchester, p. 251-261.)

Reviews present and future British housing situation, selfishness of speculative builders, and advocates that the Cooperative Wholesale Society should finance building after the war, either by initiating building departments in suitable areas or enlarging its existing building department, in addition to the governmental program.

Public utility societies, England. (Monthly labor review (U. S. Bureau of Labor Statistics), Nov. 1918, v. 7, p. 1422-1425.)

Gives a draft report of the Federation of British Industries on public utility societies for the Housing Committee, Apr. 5, 1918, in which the advantages of this form of cooperative housing society are enumerated. Suggested regulations for the constitution of such a society are also given.

WAR EMERGENCY PROBLEMS.

LABOR AND HOUSING—LABOR TURNOVER.

In addition to the references here noted, it will be found useful to consult the files of the Monthly Labor Review (U. S. Bureau of Labor Statistics) where studies and notes on labor turnover have appeared regularly. The data from the files of the Industrial Relations Division of the United States Housing Corporation when published will also add materially to the available information on the subject of labor turnover.

Ackerman, Frederick L. The Government, the architect and the artisan in relation to Government housing. (*In* Proceedings of the American Institute of Architects, 51st, 1918, p. 86-89.)

On the need of providing something worth living for and an environment worth living in, as a reward of labor.

Allen, Leslie H. The workman's home: its influence upon production in the factory and labor turnover. (Journal of American Society of Mechanical Engineers, June 1918, v. 40, p. 453-458.)

Also reprinted with a few illustrations for Aberthaw Construction Co., Boston, 1918. 23 pages. This paper presents results of a questionnaire on means of reducing labor turnover, with quotations from replies of employers, stating facts of relation of turnover and housing. A similar paper was given by Mr. Allen before the American Concrete Institute and published in its Proceedings for 1918; and another, before the National Conference on Housing, published in its Proceedings for 1918.

Fisher, Boyd. Good housing as a reducer of labor turnover. (*In* National Conference on Housing, Housing problems in America, 1918, v. 7, p. 147-174.)

Epitomizes some of the turnover reports of the field agents of the United States Housing Corporation in their preliminary investigations of war-time conditions.

Housing in the reconstruction program of Labor. (Housing betterment, Oct. 1918, v. 7, no. 3, p. 46-48.)

British and German programs. Compare the quotation from the British Labour Party's program given as note in section of this List: General, Great Britain.

Hilder, John. Housing and transportation problems in relation to labor placement. (*In* Annals of the American Academy of Political and Social Science, Jan. 1919, v. 81, p. 51-55.)

Good city planning shown to be essential to the kind of living conditions that attract labor and reduce labor turnover.

Woll, Matthew. Labor's attitude on housing. (*In* National Conference on Housing, Housing problems in America, 1918, v. 7, p. 192-200. With discussion p. 297-302.)

Calls for a Government program to encourage house-building, including improved system of credits and taxation. In the discussion, by another labor representative, the sentiment of organized labor is stated as for housing as a governmental function.

REAL ESTATE ACQUISITION AND COMMANDEERING, REQUISITIONING AND BILLETING

Billeting of civilian war workers in England. (Monthly labor review (U. S. Bureau of Labor Statistics), Nov., 1918, v. 7, p. 1425-1426.)

An act of 1917 gave the British government power to billet persons engaged in work of national importance.

Shannon, William E. The Bureau of Industrial Housing and Transportation of the Department of Labor. (National real estate journal, Aug., 1918, v. 18, p. 26-27.)

The work of the Real Estate Division and the cooperation with the Government of the National Association of Real Estate Boards are described. The succeeding number of the same magazine had an article continuing this description; and a somewhat similar article appeared in Buildings and Building Management for Aug., 1918, under the title: How the Government conducts its realty business.

———. Preliminary report of the Real Estate and Com-mandeering Division, Bureau of Industrial Housing and Transportation, United States Housing Corporation, Department of Labor. (Nov. 15, 1918.) (*In* U. S. Congress, Hearings before the Committee on Public Buildings and Grounds, House of Representatives, on S. J. 194, Jan., 1919, p. 247-251.)

Later printed as Appendix V. in Report of United States Housing Corporation, Dec. 3, 1918. The procedure is comprehensively described.

REGISTRATION BUREAUS AND ROOM RENTING

Housing bureaus and room registries. (Survey, Nov. 9, 1918, v. 41, p. 166-167.)

On the Conference in New York on Housing for Girls.

Newark's efforts in homes registration and prevention of rent profiteering. (New Jersey municipalities, Sept. 1918, v. 2, p. 203-204, 222.)

Proposal for a municipal bureau of vacant houses in cities. (Conservation of life, Canada, Jan. 1918, v. 4, p. 8.)

Schaub, Edward Leroy. The house, the community, and the United States Homes Registration Service. (Chicago Real Estate Board bulletin, Mar. 1919, v. 27, p. 221-227.)

———. The U. S. Homes Registration Service as a civic asset. (American city, Apr. 1919, v. 20, p. 327-329.)

On its war-service and after-the-war usefulness in helping soldiers to re-acquire homes and in furnishing data for house-building campaigns.

Veiller, Lawrence. The "Take a Roomer" campaign. (American city, either edition, May 1918, v. 18, p. 451, 453.)

Summarizes Mr. Veiller's opinion of the dangers of such a campaign.

———, and others. Shall we encourage or discourage the "Take a Roomer" campaign? Discussion. (*In* National Housing Association, War housing problems in America, 1918, p. 93-103.)

LANDLORD AND TENANT RELATIONS. RENT PROFITEERING.

For this subject the reader should consult especially the hearings in 1918 on the bills to prevent rent profiteering in the District of Columbia, where conditions were particularly acute, as follows: Before the Subcommittee on the District of Columbia of the Senate on the bill H. R. 9248; before the Committee on the Judiciary of the House of Representatives on the bill H. R. 12443; before the Committee on Public Buildings and Grounds of the House of Representatives on the bill H. R. 12818 (also H. R. 12835). The British Increase of Rent and Mortgage Interest (war restrictions) Act of 1915, to restrict increases of rent during the war, is also of interest.

Adjustment of rent profiteering cases by the Department of Labor. (Monthly labor review, Mar. 1919, v. 8, p. 899-901.)

Gives statistics of work on cases by local anti-profiteering committees, under supervision of Housing Bureau.

Ellis, John C. Rent profiteering. (*In* National Conference on Housing, Housing problems in America, 1918, v. 7, p. 140-146.) Describes especially the "New London" anti-profiteering method.

Field, S. S. Power of city council to deal with rent profiteering. (American city, either edition, Aug. 1918, v. 19, p. 147, 149.) Substantially reprinted from the Baltimore Municipal Journal, June 21, 1918.

Ford, James. Rent profiteering. (*In* National Conference on Housing, Housing problems in America, 1918, v. 7, p. 128-139.) A statement of the work of the United States Housing Bureau to prevent rent profiteering.

Great Britain. Committee on Increases in Rental . . . in Scotland. Minutes of evidence taken before the committee. Edinburgh, Neill & Co., 1916. 72p. With appendices. Followed by Report of Committee.

Housing Betterment. Quarterly.

A number of news items relating to rent profiteering and methods of dealing with cases may be found in the issues for May and Oct. 1918.

Newark's efforts etc. See reference in preceding section of this List.

Philadelphia. Federal Fuel Administration. Report of Housing Bureau of Federal Fuel Administration. Philadelphia, Dec. 31, 1918. 18p.

Relates especially to work against rent profiteering.

Resolutions adopted at National Real Estate Conference on rent profiteering. (National real estate journal, Aug. 1918, v. 18, p. 49.)

TRANSPORTATION.

Taylor, A. Merritt. Electric railways help win the war: how electric cars were purchased, electric roads extended, etc. (Electric railway journal, Jan. 4, 1919, v. 53, p. 13-14.)

Deals with work of the Passenger Transportation and Housing Division of the Emergency Fleet Corporation, of which division Mr. Taylor was manager. A map shows places where transportation was improved.

Wells, Gardner F. Transportation work of the United States Housing Corporation. Under supervision of the Transportation Division 300 or more cars have been purchased and much work undertaken to facilitate housing of war workers. (Electric railway journal, Jan. 4, 1919, v. 53, p. 7-11. illus.)

Mr. Wells was manager of the Housing Corporation's Transportation Division.

PLANNING AND DEVELOPMENT.

GENERAL.

The technical reports of the Shipping Board (Emergency Fleet Corporation) Housing Division (referred to above) and of the United States Housing Corporation (with which this List is to be issued) together contain the greatest mass of data on Planning and Development in the United States yet available. In addition to the references on the general considerations of planning and development, the reader should consult the sections of this List: House Types; and Special Community Facilities.

Abercrombie, Patrick. The basis of reconstruction; the need for a regional survey of national resources. (Town planning review, Apr. 1918, v. 7, p. 203-210.)

Fundamental to planning for both housing and transportation.

Adams, Thomas. Community development in wartime. (Landscape architecture, Apr. 1918, v. 8, p. 109-124.)

Reprinted as: House and town development in war time (National Housing Association publication). Favors the garden city as a solution of the housing problem.

Culpin, Ewart G. The remarkable application of town planning principles to the war-time necessities of England. (Journal of the American Institute of Architects, Apr. 1917, v. 5, p. 157-159.)

Discusses types of schemes and types of houses, and the relation of the house to the larger design.

Great Britain. Local Government Boards for England and Wales, and Scotland. Report of the Committee appointed by the President of the Local Government Board and the Secretary for Scotland to consider questions of building construction in connection with the provision of dwellings for the working classes in England and Wales, and Scotland, and report upon methods of securing economy and despatch in the provision of such dwellings. London, H. M. Stationery Off. 1918. 97 p. illus. plans. (Cd. 9191.)

Known as the "Tudor-Walters" report. Mr. Raymond Unwin is largely responsible for the technical conclusions set forth. The report is called by the *Garden Cities and Town Planning* magazine "the most important [British] Government publication on housing that has yet appeared." It is reviewed by Mr. H. R. Aldridge, Secretary of the National Housing and Town Planning Council, in the *Municipal Journal*, London, Nov. 15 and 22, 1918.

Hubbard, Henry V. Some preliminary considerations in Government industrial war housing. (*Landscape architecture*, July 1918, v. 8, p. 157-168. illus. plans.)

Discusses especially "inside" vs. "outside" developments. Hilton, Va., is used as an example of the "outside" community. The article contains a table prepared by J. D. Leland 3d, showing typical earnings of workers in relation to house costs as figured for the Hilton scheme.

LaFarge, C. Grant. Regional surveys—their aim and importance in war and in peace. (*Journal of the American Institute of Architects*, Aug. 1918, v. 6, p. 402-404.)

An address before the Home Registration Service Committee of the State Council of Defense, Aug. 5, 1918, at Chicago. Mr. LaFarge deals not only with the need of a Chicago survey, but (like Professor Abercrombie, above) with the fundamental character of surveys in relation to planning.

Maintenance costs. (*Housing betterment*, Oct. 1918, v. 7, no. 3, p. 37.)

As a consideration in planning and development.

Nolen, John. The industrial village. New York, National Housing Association, Sept. 1918. 22 p. plans. (Publication no. 50.)

Similar articles on industrial village planning by Mr. Nolen appeared earlier in 1918 in his pamphlet entitled: *Industrial housing—better homes for less money*; and in the *Architectural Forum* for April, 1918. Six typical developments designed by Mr. Nolen are used as illustrations in both pamphlets.

Ormiston, Edward. The public control of the location of towns. (*Garden cities and town planning*, Feb. 1919, v. 9, p. 23-30.)

This article is reprinted from the *Economic Journal*, Dec. 1918. A part is also reprinted in *Landscape Architecture* for April 1919. An important article from point of view of economic and "social design", which bears out the garden city theory as the solution of the housing problem.

Southern Pine Association. Homes for workmen.

See entry under first section of this List: General.

Thompson, F. Longstreth, and Ernest G. Allen. The town plan and the house; an opportunity for national economy. London, The Garden Cities and Town Planning Association, (1916?) 47p. illus. plans.

Emphasizes the relation of the individual house to the whole scheme.

Wilk, Benjamin. Planning a housing development for an industrial plant. (*Industrial management*, Oct. 1918, v. 56, p. 282-283.)

The experience of a large company in Pennsylvania showing questionnaire used and tabulation of results. The previous issue of *Industrial Management* (Sept.) contained an article not definitely relating to housing, but of interest in connection with Mr. Wilk's data: How to determine the cost of living in an industrial community, by Ray M. Hudson.

TECHNICAL METHODS OF U. S. GOVERNMENT DESIGNERS.

Although most of the references in this section will be superseded by the official instructions of the Design Divisions of the United States Housing Corporation as printed in volume II of its

comprehensive report, it nevertheless seems worth while to include these references because they appeared in periodicals perhaps available to users of this List in its separate form who may not have the complete report. Of course, the instructions as published fortuitously in periodicals represent only incompletely the technical methods employed. These will be covered fully respectively in the reports of Housing Corporation and Shipping Board. Of interest also in connection with this section is the article by Mr. A. A. Shurtleff (already noted in this List), describing the successive stages in the development of a street plan for the Crane tract at Bridgeport (Housing Corporation project).

Alvord, John W. What part the engineer played in Government housing. Report of chief engineer of the United States Housing Corporation outlines work of his division. (*Engineering news-record*, Jan. 16, 1919, v. 82, p. 147-148.)

Engineering data required for a housing project. Federal Bureau of Housing issues instructions to be followed by preliminary investigators. (*Engineering news-record*, June 13, 1918, v. 80, p. 1141-1143.)

Frequency of excessive rainfalls; Data compiled by U. S. Housing Corporation from records of the Weather Bureau showing average frequency of rainfalls at various high rates. (*Municipal journal*, New York, Sept. 14, 1918, v. 45, p. 204-206. diags.)

Hubbard, Henry V. Notes on grading and planting plans for Government housing projects. (*Landscape architecture*, Apr. 1919, v. 9, p. 131-140.)

Public utilities and housing projects: notes concerning the general policy of the United States Housing Corporation with regard to arrangements with Utility Companies for serving the several housing developments—alternative methods—rates. (*Municipal journal*, New York, Oct. 5, 1918, v. 45, p. 267-268.)

Some instructions issued by the Bureau of Industrial Housing and Transportation, Department of Labor. (*Landscape architecture*, Oct. 1918, v. 9, p. 9-23.)

Includes those to Committees of Designers and to Preliminary Investigators.

Street improvements in housing developments. Tentative instructions to designers issued by the Bureau of Industrial Housing and Transportation of U. S. Department of Labor. (*Good roads*, May 25, 1918, v. 15, p. 262, 264. Editorial note on p. 263.)

These instructions were later published in the *American City* for Nov. 1918.

Suggestions to town planners. Department of Labor, Bureau of Industrial Housing and Transportation, United States Housing Corporation, Town Planning Division. (*Landscape architecture*, Jan. 1919, v. 9, p. 79-89.)

Surveying for housing projects. Instructions by Bureau of Industrial Housing and Transportation for making topographical surveys and maps of sites for housing developments. (*Municipal journal*, New York, July 13, 1918, v. 45, p. 28-29.)

Town planning lessons from Government housing operations, American City Planning Institute, Philadelphia, 1919. 24 p.

Contents: Housing operations of Emergency Fleet Corporation, by B. Antrim Haldeman, Chief Town Planner.—United States Housing Corporation, by F. L. Olmsted, Chief Town Planner.—Summary, by John Nolen.—Discussion.

Wood, N. Montgomery. Housing project schedule. (*Architectural record*, Feb. 1919, v. 45, p. 118-122.)

Form adopted and used by U. S. Shipping Board Housing Division, illustrated and explained. The schedule is for tabulating information to answer questions at all stages of the project.

HOUSING STANDARDS.

In addition to the references in this section, the reader may consult the articles on standardization in house planning in the later section of this List: Building Materials and Types of Construction.

UNITED STATES.

Official Documents.

U. S. Dept. of Labor, Bureau of Industrial Housing and Transportation. Standards recommended for permanent industrial housing developments, Mar. 1918. Washington, Govt. Print. Off., 1918. 15 p.

Reprinted in full or in part in *American Builder* and *American Contractor*, and widely commented on in the daily and periodical press. (See several of the following items.)

Representative Articles.

Crawford, Andrew Wright. Standards set by the new Federal war suburbs and war cities. 24 p., illus., plans. (*American Civic Association*, Oct. 1918, Series II, no. 12.)

A critical general consideration by a leading town planning lawyer of the standards in governmental housing, more particularly the Shipping Board projects, but also the Housing Bureau "Standards."

Nolen, John. The housing standards of the Federal Government. (*In National Conference on Housing, Housing problems in America*, 1918, v. 7, p. 118-127.)

This paper was also printed in the *American Architect* for Dec. 25, 1918.

Permanent housing standards of U. S. (Fire protection, July 1918, v. 61, p. 16-17.)

Possible results of war housing. (*Housing betterment*, May 1918, v. 7, no. 2, p. 33-34.)

Raising of standard in the United States.

Veiller, Lawrence. Industrial housing developments in America. Part II. The Government's standards for war housing. (*Architectural record*, Apr. 1918, v. 43, p. 344-359.)

Also published in *Housing betterment*, May 1918.

GREAT BRITAIN AND CANADA.

Official Documents.

Great Britain, Local Government Board. The housing of the working classes acts, 1890 to 1909: Memorandum for the use of Local Authorities with respect to the provision and arrangement of houses for the working classes. London, H. M. Stationery Off., 1917. 7 p.+12 plans.

A similar publication was issued in 1918 by the Local Government Board for Scotland.

Great Britain. Ministry of Reconstruction, Advisory Council. Women's Housing Sub-Committee. First interim report. London, H. M., Stationery Off., 1918. 7 p. (Cd. 9166.)

The Committee was appointed to visit specimen houses already erected by the British Government and to advise on plans received from the Architect's committee, with special reference to the convenience of the housewife. Several unofficial articles by members of the Committee in regard to housing from the women's point of view appeared in Labour Party publications, especially by Mrs. Sanderson-Furniss. This Interim Report was reviewed in the *Municipal Journal* (London) for Oct. 18, 1918, and in the *Monthly Labor Review* (U. S. Bureau of Labor Statistics) for Dec. 1918. A similar committee was appointed for Scotland, which has also reported. The Scottish Council for Women's Trades, Glasgow, has also issued a pamphlet on the subject.

— Final report. 1919. 21 pages. (Cd. 9232.)

Summaries all conclusions. Also reprinted as Supplement to the *Journal of the American Institute of Architects*, May, 1919.

Ontario, Canada. Housing Committee. Report of the Ontario Housing Committee, including standards for inexpensive houses, adopted for Ontario and typical plans. Toronto, Printed by Order of the Legislative Assembly of Ontario, 1919. 187 pages. illus. folded plans, details, etc.

Standards to which home builders in Ontario must conform in order to secure a loan through the Provincial Government from the \$25,000,000 Canadian fund. (Cf. section of this List; Governmental Aid.)

Representative Articles.

England adopts housing standards. (*Housing betterment*, May 1918, v. 7, no. 2, p. 18-20.)

Standards adopted by Housing and Town Planning Council.

TYPES OF COMMUNITY DEVELOPMENT.

Many of the references already given under the section of this List: Planning and Development, General, contain discussion of types of community development; e. g., articles by H. V. Hubbard and Thomas Adams. Mr. Lander's proposals referred to in an earlier part of this List, under Cooperative Societies, are also of interest in this connection.

Goodrich, Ernest P. War housing by rejuvenating blighted districts. (*Landscape architecture*, Apr. 1918, v. 8, p. 125-132.)

A plea for the building up of in-town vacant lots, for which utilities are already provided, and the rehabilitation of the vicinity.

State preparation: a model village in London. (*Municipal journal*, London, Jan. 17, 1919, v. 28, p. 61-62.)

Describes the village to be erected by the British government as a model for after-war community developments.

To what extent shall war workers be housed in temporary barracks—in permanent homes? (*In National Housing Association, War housing problems in America*, 1918, p. 3-47.)

A discussion in which the overwhelming balance of opinion was for permanent homes in a good community development wherever possible. This view was supported by the American Federation of Labor.

GARDEN CITIES

Culpin, Ewart G. A national programme. (*Garden cities and town planning*, Sept. 1918, v. 8, p. 42-45.)

Mr. Culpin made a proposal for state garden villages in the same magazine for Feb. 1916; and as Secretary (until recently) of the Garden Cities and Town Planning Association, was instrumental in the Memorandum submitted to the Government in 1917, "with special reference to the adoption of garden city methods in after-war housing." See other issues of this magazine, for June and Dec. 1917 and Sept. 1918.

Mawson, Thomas H. An imperial obligation; industrial villages for partially disabled soldiers and sailors. London, Grant Richards, Ltd., 1917. 124 p. illus. plans.

Proposes specially-planned garden villages. An editorial in *Landscape Architecture* for Oct. 1918 discusses this and similar schemes.

New towns after the war; an argument for garden cities, by New Townsmen. London, Dent, 1918. 84 p.

Issued by the British National Garden Cities Committee. This Committee proposed to meet the tremendous shortage of houses in Great Britain by the establishment of a hundred new garden cities after the model of Letchworth, in which industrial and social conditions may be offered compatible with economic efficiency and general welfare, and which shall be located in accordance with a national plan. The little book states the arguments for the undertaking, outlines its financial basis, and discusses the part to be assumed by the Government, by industrial capital, and by public utility societies.

Purdom, Charles Benjamin. The garden city after the war; a discussion of the position of the garden city at Letchworth, and a proposal for a national housing policy. (*Letchworth 1917?*) 22 p.

Mr. Purdom (now Secretary of the Garden Cities and Town Planning Association) has been officially connected with Letchworth for several years and is one of the supporters of the New Towns proposal. A summary of Mr. Purdom's conclusions from the experience of Letchworth appeared in *Garden Cities and Town Planning* for Sept. 1918.

Unwin, Raymond. Nothing gained by overcrowding. How the garden city type of development may benefit both owner and occupier. London, Garden Cities and Town Planning Association, 1918. 23 p. illus. plans.

Foreword to third edition, 1918, by the Marquis of Salisbury, noting especial appropriateness in republication owing to Mr. Unwin's work in planning the war towns.

CONSTRUCTION OF HOUSING SCHEMES.

Although many articles have appeared dealing with construction work on the army cantonments, very few articles deal with construction of houses by the Federal Government. Some notes on the construction of the individual projects may be found in the articles in the section of this List: U. S. Bureau of Industrial Housing and Transportation, Projects. A summary of this Bureau's construction work may be found in the Appendix to the United States Housing Corporation Report of Dec. 3, 1918. See also the Shipping Board towns project schedule given in the article by Mr. Woods in the section Technical Methods, above.

Construction camps model towns on Miami Flood Works; villages of homes, with schools, community halls, markets, water mains, lights and sewers, house workmen at the five large dams being built. (Engineering news-record, Sept. 26, 1918, v. 81, p. 575-578. illus. plans.)

Lea, Samuel H. Labor-saving machinery used in building houses. (Engineering news-record, Apr. 17, 1919, v. 82, p. 753-755. illus.)

Construction methods at Cradock, Va. (Housing Corporation development), by the assistant engineer on the project. Cf. the other article on Cradock, previously referred to.

Magnusson, Leifur. A modern industrial suburb. (U. S. Bureau of Labor Statistics, Monthly review, Apr. 1918, v. 6, p. 729-753. illus. plans.) Also reprinted.

Morgan Park, Duluth, Minn. Pp. 735-739 deal with the treatment of labor camps.

United States Housing Corporation. Construction Division. Manual of instructions on fire protection for use of works superintendents. Prepared by the National Board of Fire Underwriters. Washington, U. S. Department of Labor. Bureau of Industrial Housing and Transportation, Oct. 1, 1918. 16 p. Deals with the protection of properties during erection.

HOUSES: HOUSE TYPES AND TYPES OF CONSTRUCTION.

HOUSE TYPES.

For this subject, the reader should also consult the section of this List: Housing Standards.

United States.

Two competitions to secure house types for American use should be noted: one just before the war held by the National Americanization Committee, the plans submitted being published in a special number of the Architectural Review for Jan. 1917, and a recent competition conducted by the Journal of the American Institute of Architects (see issue for May 1918), the awards in which were announced in the Journal for May 1919. In addition to the references given below, the reader should consult the numerous pictures and plans, often with discussion of types of single houses and hotels, in the articles on the U. S. Government developments (see earlier sections of this List).

HOTELS AND APARTMENTS.

Cf. also the discussion on temporary vs permanent community development at the Philadelphia war housing conference Feb. 1918, noted in the section of this List: Types of Community Development.

Emergency Fleet Corporation hotels. (Journal of the American Institute of Architects, Nov. 1918, v. 6, p. 519-523. illus. plans.)

[Housing women workers, a discussion.] (In National Housing Association, War housing problems in America, 1918, p. 71-103.)

Bridgeport experience, hotels for British munition workers, Y. W. C. A., etc.

Smith, Henry Atterbury. Garden apartments for industrial workers. (American architect, May 22, 1918, v. 113, p. 686-689. illus. plans.)

One of several articles on the same theme by the same author in various magazines. A somewhat similar article by Mr. A. C. Bossom, arguing in favor of industrial housing in specially designed apartments, appeared in the Architectural Record for Sept. 1918.

Young Women's Christian Association. Housing for women in war work; report of the Housing Committee of the War Work Council, Young Women's Christian Association, Jan. 1918. New York, (1918). 20 p. illus. plans.

Suggestions made to the Secretary of War. An article based on these Y. W. C. A. plans, by R. H. Moulton, appeared in the Architectural Record for Nov. 1918.

SINGLE AND GROUP HOUSES.

Best homes planned for recent industrial housing operations. (Building age, Sept. 1918, v. 40, p. 433-448. illus. plans.) A pictorial supplement.

Dana, R. H., Jr. The group house—its advantages and possibilities: the mania for the detached house. (In National Conference on Housing, Housing problems in America, 1918, v. 7, p. 201-210. With discussion, p. 303-311.) Also published in American Architect for Jan. 29, 1919.

Hamlin, A. D. F. The workingman and his house. (Architectural record, Oct. 1918, v. 44, p. 302-325. illus. plans.) Discusses principles and gives numerous examples of types.

Hamlin, Winthrop Abbott. Low-cost cottage construction in America; a study based on the housing collection in the Harvard Social Museum. Cambridge, Mass., Harvard University, 1917. 30 p. illus. plans. (Publications of the Dept. of Social Ethics in Harvard University. No. 7.)

Kilham, Walter H. Some advantages of the two-family house. (Building age, Feb. 1918, v. 40, p. 114.) Extracted from article in Building Management. Refers to semi-detached houses.

Mead, Marcia. The architecture of the small house as influenced by our modern industrial communities. (Architecture, June 1918, v. 37, p. 145-154. illus. plans.)

Southern Pine Association. Homes for workmen. See reference under first section of this List: General.

Winslow, Ralph E. The workingman's home from the workingman's point of view. (House beautiful, Apr. 1918, v. 43, p. 265-266, 314. illus. plans.) The author is a shipworker.

Great Britain

For British house types, the "Tudor-Walters" report (already referred to above) should be especially consulted and the volume published by the Journal of the American Institute of Architects, The Housing Problem in War and in Peace, noted in the section at the beginning of this List: General.

Baines, Sir Frank. Housing: Planning and materials, permanent and semi-permanent. (London) 16 p.

Paper read at London Sessional meeting of the Royal Sanitary Institute. Apr. 24, 1918. Discusses practical types. Warns against overhaste in standardization. Cf. note under previous section of this List: Housing Standards.

Royal Institute of British Architects. Cottage designs. Housing of the working classes in England and Wales. London, 1919? illus. plans.

Preliminary publication of the results of this competition was made in the Journal of the Royal Institute of British Architects, *The Builder*, *The Journal of the American Institute of Architects* (July 1918), *Housing Betterment* (Feb. 1919), etc. A similar competition for Scotland is noted in the Journal of the R. I. B. A. for Sept. 1918 and quoted in the Journal of the A. I. A. for Dec. 1918.

Scotland. Royal Commission on Housing in Scotland. Special report with relative specifications and plans, prepared by Mr. John Wilson, F. R. I. B. A. (Architectural Inspector of the L. G. B. for Scotland) on the design, construction, and materials of various types of small dwelling-houses in Scotland. Edinburgh, 1917. 44 p. illus. plans. (Cd. 8760.)

Technical Journals, Ltd. Houses for workers. (London), Technical Journals, Ltd. (1917?) 68 p+34 plates. plans.

Contents:—Cottages for rural and urban workers—Government housing scheme at Well Hall, Eltham, Kent.—Housing on the Kennington estate.

Unwin, Raymond. Housing: the architects' contribution. (Journal of the Royal Institute of British Architects, Jan. 1919, v. 26, p. 49-59. illus. plans. With discussion p. 60-63.)

Read before the R. I. B. A. Describes the function of the architect in the use of imagination in design and discusses the types of houses suitable for English life.

BUILDING MATERIALS AND TYPES OF CONSTRUCTION.

United States.

Much of the literature issued in this field has been of an advertising nature, in the form of booklets containing specimen illustrations of houses manufactured by, or from products made by, certain dealers,—either makers of temporary, ready-cut or portable houses or manufacturers of building materials. Such publications are indexed in Mr. Boyd's Structural Service Handbook mentioned below and in its continuations in the Structural Service Department of the Journal of the American Institute of Architects. Articles in periodicals on building materials for war housing have dealt almost entirely with concrete construction and their conclusions are more conveniently summarized in the Proceedings of the American Concrete Institute, and in the Whipple and Gilbert publication, both noted below.

American Concrete Institute. Proceedings of the Fourteenth Annual Convention, Atlantic City, N. J., June 27-29, 1918. Chicago, Ill. The Institute. 592 p. illus. diagrs. tables, etc.

In addition to the report of the Institute's Committee on Industrial Concrete Houses, this volume contains the following papers especially relating to concrete in industrial housing:

Advantages and disadvantages of the concrete house, by J. E. Conzelman.
The concrete industrial house; a record of achievement, by C. D. Gilbert.
Methods of constructing concrete houses, by K. H. Talbot.
Architectural details of the concrete house, by E. G. Perrot.
Interior construction of the industrial house, by M. D. Morrill.

Boyd, D. Knickerbacker, ed. Structural service book, Vol. I. A revised reprint from the twelve issues for 1917 of the Journal of the American Institute of Architects, Structural Service Department. Washington, American Institute of Architects, Jan. 1, 1918. 226 p.

Presents as complete as possible a résumé of "all governmental, professional, technical, commercial and industrial activities concerning the art and science of building," including bibliographies. Especially valuable as listing publications on single materials and their sources and production.

National Board of Fire Underwriters. Dwelling houses; a code of suggestions for their construction and fire protection, recommended by the National Board of Fire Underwriters, N. Y. First edition 1916. 115 p. illus. details, sections, etc.

National Fire Protection Association. Committee on Fire-Resistive Construction. Recommendations on emergency housing. (*In Proceedings of National Fire Protection Association*, Boston, 1918. p. 214-216.) Also reprinted.

U. S. Bureau of Standards. Materials for the household. Circular No. 70, 1st ed. Dec. 5, 1917. Washington, Govt. Print. Off., 1917. 259 p. illus.

U. S. War Industries Board. Building Materials Division. Functions, organization and standard specifications and details for war building projects.

To be published.

Whipple, Harvey, and C. D. Gilbert, eds. Concrete houses and how they were built. Detroit, Concrete-Cement Age Pub. Co., 1917. 94 p. illus. plans.

"Articles on various types of concrete houses and problems of their construction with plans and detail drawings, compiled from Concrete."

Great Britain.

The "Tudor-Walters" report, already referred to several times (for full imprint see the section of this List: Planning and Development), discusses cottage construction comprehensively. Several articles on the subject have appeared in the *Municipal Journal* (London) for 1918, especially noteworthy being those in the issues for Apr. 26 (on standardization,) including summary of the paper by Sir Frank Baines (referred to above); June 7, (by Mr. W. R. Young of Rosyth on standardization); and July 19, 1918 (by W. E. H. Burton). The reader is referred further to the references already given under sections of this List: Housing Standards; and House Types.

HOME OWNERSHIP AND MANAGEMENT PROBLEMS.

HOME OWNERSHIP.

A call to build; home making as the backbone of war work. (Touchstone, Sept. 1918, v. 3, p. 489-493, 538. illus.)

Quotes Messrs. Sheppard's and Eidlitz's press interviews favoring home ownership and land settlement.

Conference promotes "Build Your Own Home" movement: discusses legislative measures whereby loan association securities may be made available. (*Engineering news-record*, Feb. 13, 1919, v. 82, p. 348, 350.)

Conference called by Director of Division of Public Works and Construction Development, Department of Labor. The tentative draft of a bill to promote home building is noted in the section of this List: Housing Finance. In that same section, compare also the article by Mr. Schermerhorn.

Magnusson, Leifur. Methods of sale of company houses. (Monthly labor review (U. S. Bureau of Labor Statistics), Apr. 1919, v. 8, p. 1173-1178.)

Summary of the methods of thirty-three industrial corporations.

Shall houses for war workers be rented or sold? A discussion. (*In National Housing Association*, War housing problems in America, 1918, p. 51-68.)

U. S. Department of Labor. Information and Education Service. Suggestions for Own-Your-Own-Home campaigns. Washington, Govt. Print. Off., 1919. 46 p.

In addition to general suggestions contains as illustration of method an account of the Portland, Ore., campaign.

RENTING AND MANAGEMENT.

In this field published material is scarce. In addition to the references following, the reader should consult the Report of the Operating Division of the United States Housing Corporation in its report of Dec. 3, 1918, and also the references given in the sections of this List: Government Housing; Cooperative Societies; and Garden Cities.

United States.

Aron, Harold G. Some problems of management. (*In National Conference on Housing, Housing problems in America, 1918, v. 7, p. 234-241.*)

A paper by the Chief of the Property Bureau of the Shipping Board Housing Division.

Brazer, Clarence Wilson. The future of Government villages. (*American architect, Feb. 12, 1919, v. 115, p. 219-221.*)

Advocating the disposition of Government housing developments (as soon as proper guarantees for administration and maintenance can be obtained) by selling on partial payments rent-paying first mortgage bonds secured by the value of the houses, as a substitute for the copartnership method.

Cawcroft, Ernest. The present and future government of war created communities. (*Journal of the American Institute of Architects, Dec. 1918, v. 6, p. 553-558.*)

An address at the Rochester Reconstruction Conference. *Also published in National Municipal Review for Jan. 1919.* The article deals with the general principles of government which ought to be observed in the war communities, with special reference to the towns of the Shipping Board (with which Mr. Cawcroft was connected).

Feld, Fred C. Some problems of management. (*In National Conference on Housing, Housing problems in America, 1918, v. 7, p. 211-223.*)

The writer is rental manager of Yorkship Village, a Shipping Board town.

Taylor, C. Stanley.

See reference under section of this List: Cooperative Societies.

Great Britain.

Administration of the Woolwich (Well Hall, Kent) government housing scheme. (*Monthly labor review (U. S. Bureau of Labor Statistics), Oct. 1918, v. 7, p. 1094-1096.*)

Includes tenancy regulations.

The British hostels for munition workers. (*U. S. Bureau of Labor Statistics, Monthly review, June 1918, v. 6, p. 1568-1572.*)

Describes especially the finances, management, and recreation provisions of the women's hostels.

Hutton, J. E. Welfare and housing, a practical record of war-time management. London, Longmans Green & Co., 1918. 192 p. illus. plans.

A most valuable and detailed consideration of the methods and work of the Vickers Co., Ltd., England.

SPECIAL COMMUNITY FEATURES.

The subject matter of this section is closely associated with problems of operation and management; and the reader should consult also the references given in the preceding section of this List, especially the book by Hutton.

Cotterell, Mabel. Welfare work in Gretna. (*In U. S. Congress, 65th. House. Hearings on S. 3389. Housing for employees of shipyards, Jan. 1918, p. 77-80.*)

The author was lady welfare superintendent at Gretna.

Great Britain. Ministry of Munitions. Health of Munition Workers Committee. Final report industrial health and efficiency. 1918.

Section XIX. Welfare outside the factory. Clubs—Recreation provisions—Welfare workers.

Whitney, Anice L. Housing and welfare work. Clubs, gymnasiums, and recreation grounds for employees. (*U. S. Bureau of Labor Statistics, Monthly review, Nov. 1917, v. 5, p. 1035-1046.*)

Facts from study of employees' welfare made by agents of U. S. Bureau of Labor Statistics. Types of building and equipment, number of people provided for, etc.

Kimball, Fiske. The social center. Part I. Commercial and cooperative enterprises (*Architectural record, May 1919, v. 45, p. 417-440. illus. plans.*)

May, Charles C. A post-war construction program: the building bureau of the International Committee of the Y. M. C. A. Part I. (*Architectural record, Mar. 1919, v. 45, p. 217-241. illus. plans.*)

The article shows neighborhood buildings suitable for industrial communities.

Towson, Charles R. Part I. A needed supplement to industrial housing. Part II. Specimen requirements for a Y. M. C. A. building for community of from 200 to 500 families. (*American architect, May 15 and 22, 1918, v. 113, p. 616-621, 667-672. illus. plans.*)

Wilson, Samuel. The community house; an element in reconstruction. (*American city, Dec. 1918, v. 19, p. 467-470.*)

Notes its value in industrial welfare work.

Calvert, A. C. Public schools in the new war cities; the unit system provides for future growth. (*American city, Nov. 1918, p. 360-362. plans.*)

Standard plans approved by war authorities for Government Ordnance towns, showing minimum and maximum development of units. The article also mentions other activities of the Community Organization Branch of the Ordnance Department.

Communal kitchens for new town planning; should the Government insist on their inclusion in the coming schemes. (*Municipal journal, London, Oct. 4, 1918, v. 27, p. 993. Editorial note, p. 990.*)

There are numerous other brief items on community kitchens in the file of the Municipal Journal for 1918.

Crum, Frederick S. Restaurant facilities for shipyard workers. Washington, Industrial Service Section, Emergency Fleet Corporation, 1918. 63 p. illus. plans.

Reviewed in U. S. Bureau of Labor Statistics, Monthly review, Sept. 1918

Geary, Blanche. Handbook of the Association cafeteria. New York, Y. W. C. A., 1917. 91 p. illus.

Great Britain. Ministry of Food. Handbook giving instructive advice to local authorities on subject of National kitchens and restaurants, by National Kitchens Division of the Ministry of Food, Charles F. Spencer, Director. London, 1918. 64 p. illus.

Whitney, Anice L. Communal kitchens in European countries. (*U. S. Bureau of Labor Statistics, Monthly review, June 1918, v. 6, p. 1420-1425.*)

HOUSING FINANCE.

GENERAL.

In addition to the references below, the reader should consult the following other sections of this List: under Housing Agencies especially the sub-sections Government, and Cooperative Societies, in which latter, the publications of the Committee on New Industrial Towns should be especially noted; Home Ownership, especially the publication of the U. S. Department of Labor; and Land and Taxation, especially the article by Leifur Magnusson. The reader is also referred to the Proceedings of the United States League of Building and Loan Associations.

Clough, Arthur F. Planning and financing the industrial housing project. (*American architect, May 15 and 22, 1918, v. 113, p. 583-587, 653-659.*)

A summary and discussion of the various possible methods.

Federal Commission to study financing of housing. (Housing betterment, Feb. 1919, v. 8, no. 1, p. 14.)

Notice of the Kenyon bill to create such a commission.

Natié, J. Various ways in which the industrial housing project is financed. (Building age, Sept. 1918, v. 40, p. 431.)

A brief outline considering the housing company, the copartnership scheme and employers' operation.

GOVERNMENTAL AID.

The compendium of information on this subject is the Bulletin of the U. S. Bureau of Labor Statistics (no. 158): Government aid to home owning and housing of working people in foreign countries, issued in 1915, a year after a similar summary published by the Massachusetts Homestead Commission as an appendix to its first report (1913-14, now out of print).

Howe, F. R. Federal aid to home building. (Architectural forum, May 1919, v. 30, p. 137-140.)

Discusses Credit Foncier and Farm Loan System, and sketches the organization of a Federal Mortgage Bank for the United States.

Williams, F. B. Government aid to housing in the light of foreign experience. (Journal of the American Institute of Architects, Nov. 1917, v. 5, p. 547-550.)

Summarizes the war emergency methods of financing housing employed by European governments with especial reference to their application to the situation of the United States.

Wood, Edith Elmer. What is a house? VI. Constructive housing legislation and its lesson for the United States. (Journal of the American Institute of Architects, Feb. 1918, v. 6, p. 58-67.)

Also published in Whitaker and others, The housing problem in war and peace, p. 69-78. On Governmental aid to home-building in various countries.

United States.

Ihlder, John. Government aid to housing in war-time—and after. (Journal of the American Institute of Architects, Oct. 1917, v. 5, p. 489-490.)

Advocates Government advances of capital for house-building, to meet war shortage, and, with proper safeguards, the continuance of the practice after the return of peace.

Schermerhorn, C. E. A Government individual home building corporation. (American architect, Sept. 18, 1918, v. 114, p. 338-340.)

Proposes special corporation for home building for ownership.

U. S. Department of Labor. Information and Education Service. Division of Public Works and Construction Development. Tentative draft of a bill to promote home building. Washington, Govt. Print. Office, 1919. 27 p.

"A tentative draft of a bill designed to enable building and loan associations to increase their resources and aid more efficiently in financing construction work in their respective localities."

Canada.

Canada. Orders in Council. Housing project of federal government. Orders in Council with reference to the granting of a loan of \$25,000,000 for the erection of dwellings, the constitution of the Cabinet Committee on Housing and the general principles regarding provincial housing schemes. Ottawa, Mar. 1919. 15 p.

Federal and provincial housing schemes; Federal loan of \$25,000,000. (Conservation of life, Canada, Jan. 1919, v. 5, p. 1-4.)

A condensed statement of the terms of the loan also by Mr. Thomas Adams, appeared in the American City (city edition) for Apr. 1919.

Government aid to housing in Canada. (Housing betterment, Feb. 1919, v. 8, no. 1, p. 14-22.)

Appended: Ontario takes advantage of Government aid, (p. 22-24.) Cf. the Ontario standards previously noted.

Great Britain.

The British Government's terms in aid of after-war housing were stated in circulars to Local Authorities issued by the Local Government Boards of England and of Scotland, March 18, 1918. These terms were widely discussed in the periodical press in the period following that date. The National Housing and Town Planning Council issued later in 1918 a Memorandum on this circular explaining terms and procedure. In Feb. 1919 a revised Circular was issued, embodying the Government's concessions, the results of the efforts of Local Authorities, Labour Party and housing experts to secure more liberal assistance. It is announced that the English Local Government Board is preparing a manual covering terms, procedure, and standards. In addition to the L. G. B.'s publications, the Ministry of Reconstruction has issued an Interim Report on financial assistance to public utility societies (Cd. 9223, 1918.) Useful summaries of all the British governmental aid proposals and criticisms thereon will be found in the files of the Municipal Journal (London) 1918-1919, especially the three articles noted in chronological order below covering the two circulars and the new housing bill. The reader should consult in addition the references already given in this list in the sections: General, Great Britain; and Housing Agencies, Government, Great Britain.

State aid for housing; the government scheme at last. (Municipal journal, London, Mar. 22, 1918, v. 27, p. 317, 319.)

The Government terms: new proposals to secure rapid housing. (Municipal journal, London, Feb. 14, 1919, v. 28, p. 161-162.)

Editorial note, p. 151. On the revised L. G. B. Circular to Local Authorities.

The housing bill. Some important provisions. Position of public utility societies. Land legislation delays. (Municipal journal, London, Mar. 28, 1919, v. 28, p. 313.) (Cf. p. 328-330.)

LAND VALUES AND TAXATION.

The British Government has already recognized the fundamental character of the land question by the recommendations of the Ministry of Reconstruction on the compulsory acquisition of land in England and Wales and by the bill before Parliament (see the Municipal Journal, Mar. 28, 1919). The specific relations of land and housing are discussed in the references following. The reader is referred also to the publications of the **Committee on New Industrial Towns** noted in the section of this List: Cooperative Societies. This Committee was "organized in 1916 for the study of methods whereby the unearned increments of land value which are created in various localities by the influx of new populations following the establishment of new industries may be anticipated, conserved, and converted into extra annual revenue for the community."

Adams, Thomas. The need of town planning legislation and procedure for control of land as a factor in house-building development. (Journal of the American Institute of Architects, Feb. and Mar. 1918, v. 6, p. 68-70, 135-137.)

Also reprinted in the Housing Problem in War and in Peace.

———. The purchase of land for building purposes; effects of high land values and some principles of land valuation with interest tables. (Conservation of life, Canada, July-Sept. 1916, v. 2, p. 73-80.)

Adams, Thomas. Should Governments conscript land or regulate its use? (Conservation of life, Canada, July 1918, v. 4, p. 59-61.)

"In both the cities and the rural districts it should be made illegal in future for any person to acquire a title to any area of land except for use."

———. Town planning in relation to land taxation: cities should have agricultural zones: examples of Canadian cities. (National municipal review, Mar. 1919, v. 8, p. 109-113.)

"The whole problem of housing is mixed up with this question of the development of land, and the latter is so dependent upon town planning of the right kind that housing and town planning schemes must proceed side by side if economical results are to be obtained. If governments will give us the right kind of legislation to control land development it will be a great aid towards the solution of the housing problem. Given this legislation and a proper organization to begin with, financial aid can produce better results."

Magnusson, Leifur. Housing and the land problem. (U. S. Bureau of Labor Statistics, Monthly review, May 1918, v. 6, p. 1316-1325.)

Discusses aspects of the land problem in housing by industrial corporations, by co-partnership companies and by Government aid or ownership.

Whitaker, Charles Harris. Land and the housing question. (New Republic, Feb. 23, 1918, v. 14, p. 113-114.)

This and numerous articles by the same writer declare that fundamental to a solution of the housing problem is the solution of the land problem, including the securing to the community of the unearned increment in land values and a revision of our system of taxation.

Zangerle, John A. Rules and principles with land and building values controlling the 1917 "Community Assessment" of Cuyahoga County (Cleveland, Ohio). 35 p. +30 maps. illus.

Of particular interest for its outline of a fair method of assessing residential property, with schedules and illustrations of house types.



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